Weston Solutions, Inc.
205 Campus Drive
Edison, New Jersey 08837
732-417-5800 • Fax: 732-417-5801
www.westonsolutions.com

The Trusted Integrator for Sustainable Solutions

Site Assessment Team 2
EPA CONTRACT EP-S5-06-04, TO13 (REGION 2 SAT)

November 26, 2013

Mr. Andrew Fessler, Work Assignment Manager
U.S. Environmental Protection Agency
290 Broadway, 18th Floor
New York, NY 10007-1866

EPA CONTRACT No.: EP-S5-06-04
TDD No.: S05-0013-1307-008
DOCUMENT CONTROL No.: 2223-2E-BKGP

SUBJECT: SITE-SPECIFIC UFP-QUALITY ASSURANCE PROJECT PLAN
NIAGARA FALLS BOULEVARD
NIAGARA FALLS, NIAGARA COUNTY, NY

Dear Mr. Fessler,

Enclosed please find the draft Site-Specific Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP) for the Preliminary Assessment/Site Inspection sampling to be conducted at the Niagara Falls Boulevard site located in Niagara Falls, Niagara County, New York. If you have any questions or comments, please do not hesitate to contact me at (732) 417-5814.

Sincerely,

Weston Solutions, Inc.

Denise Breen

Denise Breen
Assistant Project Scientist

Enclosure
cc: TDD File No.: S05-0013-1307-008
Cathy Romano, EPA
M. Hauptman, EPA
G. Gilliland, WESTON

DRAFT
SITE-SPECIFIC UFP QUALITY ASSURANCE PROJECT PLAN

Niagara Falls Boulevard
9540 Niagara Falls Boulevard
Niagara Falls, NY 14304

Prepared By:

START Region 5, TO13 (Region 2 SAT)
Weston Solutions, Inc.
Edison, New Jersey 08837

DCN No.: 2223-2E-BKGP
TDD No.: S05-0013-1307-008
EPA Contract No.: EP-S5-06-04

November 2013

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LIST OF ATTACHMENTS

LIST OF ACRONYMS

ADR	Automated Data Review
ANSETS	Analytical Services Tracking System
AOC	Acknowledgment of Completion
ASTM	American Society for Testing and Materials
CEO	Chief Executive Officer
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
CFM	Contract Financial Manager
CO	Contract Officer
COI	Conflict of Interest
COO	Chief Operations Officer
CRDL	Contract Required Detection Limit
CRTL	Core Response Team Leader
CRQL	Contract Required Quantitation Limit
CQLOSS	Corporate Quality Leadership and Operations Support Services
CWA	Clean Water Act
DCN	Document Control Number
DESA	Division of Environmental Science and Assessment
DI	Deionized Water
DPO	Deputy Project Officer
DQI	Data Quality Indicator
DQO	Data Quality Objective
EM	Equipment Manager
EDD	Electronic Data deliverable
ENVL	Environmental Unit Leader
EPA	U.S. Environmental Protection Agency
ERT	Environmental Response Team
FASTAC	Field and Analytical Services Teaming Advisory Committee
GC/ECD	Gas Chromatography/Electron Capture Detector
GC/MS	Gas Chromatography/Mass Spectrometry
HASP	Health and Safety Plan
HRS	Hazard Ranking System
HSO	Health and Safety Officer
ITM	Information Technology Manager
LEL	Lower Explosive Limit
MSA	Mine Safety Appliances
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NELAC	National Environmental Laboratory Accreditation Conference
NELAP	National Environmental Laboratory Accreditation Program
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration

LIST OF ACRONYMS (Concluded)

OSWER	Office of Solid Waste and Emergency Response
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, Sensitivity
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PIO	Public Information Officer
PM	Program Manager
PO	Project Officer
PRP	Potentially Responsible Party
PT	Proficiency Testing
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QMP	Quality Management Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RC	Readiness Coordinator
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
RSCC	Regional Sample Control Coordinator
SARA	Superfund Amendments and Reauthorization Act
SAT	Site Assessment Team
SEDD	Staged Electronic Data Deliverable
SOP	Standard Operating Practice
SOW	Statement of Work
SPM	Site Project Manager
START	Superfund Technical Assessment and Response Team
STR	Sampling Trip Report
TAL	Target Analyte List
TCL	Total Compound List
TDD	Technical Direction Document
TDL	Technical Direction Letter
TO	Task Order
TQM	Total Quality Management
TSCA	Toxic Substances Control Act
UFP	Uniform Federal Policy
VOA	Volatile Organic Analysis
WAM	Work Assignment Manager

CROSSWALK

The following table provides a "cross-walk" between the QAPP elements outlined in the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP Manual), the necessary information, and the location of the information within the text document and corresponding QAPP Worksheet. Any QAPP elements and required information that are not applicable to the project are circled.

QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
Project Management and Objectives			
2.1 Title and Approval Page	- Title and Approval Page	Approval Page	1
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2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	Approval Page	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications - Special Personnel Training Requirements	2	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	1	 9 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria	3	11 12
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QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
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3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References - Analytical Instrument Calibration - Analytical Instrument and Equipment Maintenance, Testing, and Inspection	6	23 24 25
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QAPP Element(s) and Corresponding Section(s) of UFP-QAPP Manual	Required Information	Crosswalk to QAPP Section	Crosswalk to QAPP Worksheet No.
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QAPP Worksheet #1: Title and Approval Page

Title: Site-Specific UFP Quality Assurance Project Plan (QAPP)
Site Name/Project Name: Niagara Falls Boulevard
Site Location: 9540 Niagara Falls Boulevard, Niagara Falls, Niagara County, NY 14304
Revision Number: 00
Revision Date: Not Applicable

EPA Region 2
Lead Organization

Denise Breen
Weston Solutions, Inc.
205 Campus Dr., Edison, NJ 08837
Email: Denise.Breen@westonsolutions.com
Preparer's Name and Organizational Affiliation

November 19, 2013
Preparation Date (Day/Month/Year)

Site Project Manager:

Signature

Denise Breen/Weston Solutions, Inc.
Printed Name/Organization/Date

QA/Technical Reviewer:

Signature

Gerald V. Gilliland/Weston Solutions, Inc.
Printed Name/Organization/Date

EPA Region 2 Work Assignment Manager (WAM):

Signature

Andrew Fessler/EPA Region 2
Printed Name/Organization/Date

Other EPA Approval Signature:

Signature

Printed Name/Organization/Date

QAPP Worksheet #2: QAPP Identifying Information

Site Name/Project Name: Niagara Falls Boulevard
Site Location: 9540 Niagara Falls Boulevard, Niagara Falls, Niagara County, NY 14304
Operable Unit: 00
Title: Site-Specific UFP QAPP
Revision Number: 00
Revision Date: Not Applicable

1. **Identify guidance used to prepare QAPP:**
   Uniform Federal Policy for Quality Assurance Project Plans. Refer to Laboratory Methods.
2. **Identify regulatory program:** EPA, Region 2
3. **Identify approval entity:** EPA, Region 2
4. **Indicate whether the QAPP is a generic or a site-specific QAPP.** Site-specific.
5. **List dates of scoping sessions that were held:** 10/24/2013
6. **List dates and titles of QAPP documents written for previous site work, if applicable:**

   None
7. **List organizational partners (stakeholders) and connection with lead organization:**

   None
8. **If any required QAPP elements and required information are not applicable to the project, then provide an explanation for their exclusion below:**

   None
9. **Document Control Number:** 2223-2E-BKGP

QAPP Worksheet #3: Distribution List

[List those entities to which copies of the approved site-specific QAPP, subsequent QAPP revisions, addenda, and amendments are sent]

QAPP Recipient	Title	Organization	Telephone Number	Fax Number	E-mail Address	Document Control Number
Andrew Fessler	WAM/Task Monitor	EPA, Region 2	(212) 637-4344	(212) 637-3256	Fessler.Andrew@epa.gov	2223-2E-BKGP
Mel Hauptman	Pre-Remedial Section Chief	EPA, Region 2	(212) 637-4338	(212) 637-3256	hauptman.mel@epa.gov	2223-2E-BKGP
Cathy (Moyik) Romano	Deputy Project Officer	EPA, Region 2	(212) 637-4339	(212) 637-3256	moyik.cathy@epa.gov	2223-2E-BKGP
Gerry Gilliland	Task Order Manager	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	(732) 417-5826	(732) 417-5801	Gerry.gilliland@westonsolutions.com	2223-2E-BKGP
Denise Breen	Site Project Manager	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	(732) 417-5814	(732) 417-5801	Denise.Breen@westonsolutions.com	2223-2E-BKGP
Site TDD File	START Region 5 Site TDD File	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	Not Applicable	Not Applicable	Not Applicable	2223-2E-BKGP

QAPP Worksheet #4: Project Personnel Sign-Off Sheet

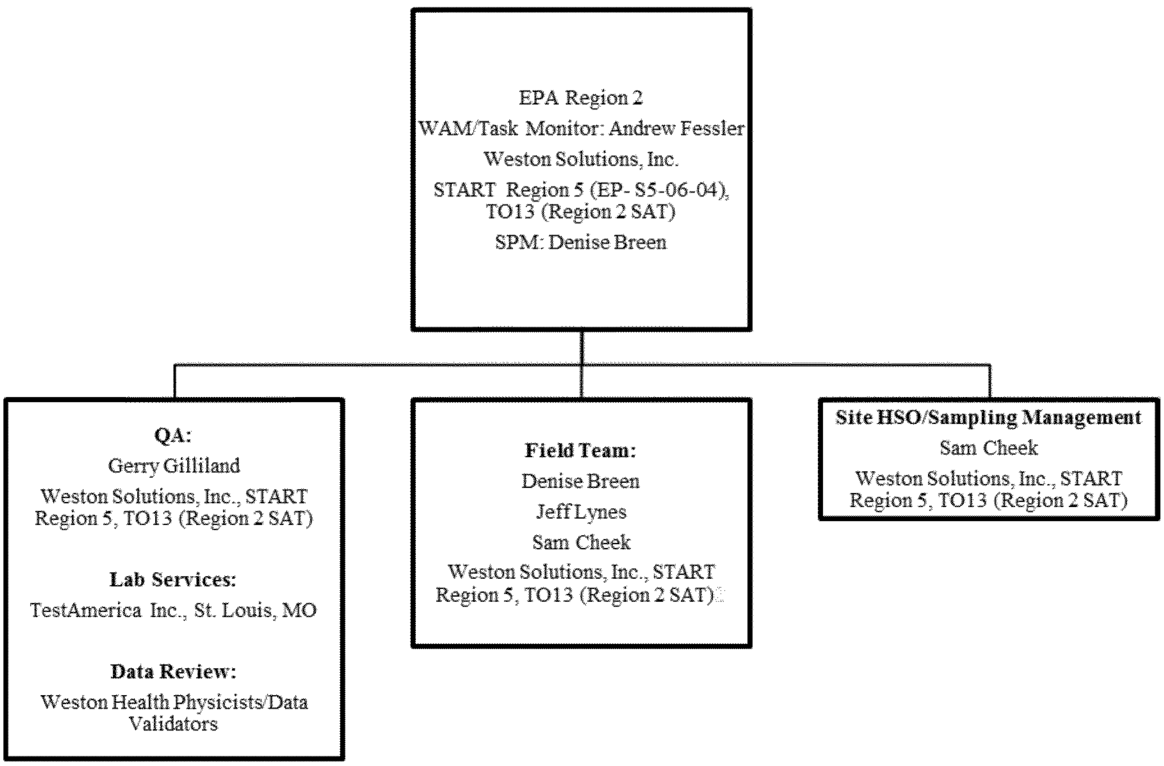
[Copies of this form signed by key project personnel from each organization to indicate that they have read the applicable sections of the site-specific QAPP and will perform the tasks as described; add additional sheets as required. Ask each organization to forward signed sheets to the central project file.]

Organization: Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)

Project Personnel	Title	Telephone Number	Signature	Date QAPP Read
Andrew Fessler	EPA, Region 2, WAM/Task Monitor	(212) 637-4344		
Gerry Gilliland	Task Order Manager, START Region 5, TO13 (Region 2 SAT)	(732) 417-5826		
Denise Breen	SPM, START Region 5, TO13 (Region 2 SAT)	(732) 417-5814		
Michele Capriglione	Technical Reviewer, START Region 5, TO13 (Region 2 SAT)	(732) 417-5808		
Jeff Lynes	Field Personnel, START Region 5, TO13 (Region 2 SAT)	(732) 417-5833		
Sam Cheek	Field Personnel, START Region 5, TO13 (Region 2 SAT)	(469) 666-5585		

QAPP Worksheet #5: Project Organizational Chart

Identify reporting relationship between all organizations involved in the project, including the lead organization and all contractor and subcontractor organizations. Identify the organizations providing field sampling, on-site and off-site analysis, and data review services, including the names and telephone numbers of all project managers, project team members, and/or project contacts for each organization.



Acronyms:

EPA – U.S. Environmental Protection Agency
HSO – Health & Safety Officer
WAM – Work Assignment Manager
QAO – Quality Assurance Officer
START – Superfund Technical Assessment and Response Team
SPM – Site Project Manager

QAPP Worksheet #6: Communication Pathways

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure
Point of contact with EPA WAM	SPM, Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	Denise Breen	(732) 417-5814	All technical, QA and decision-making matters in regard to the project (verbal, written or electronic)
Adjustments to QAPP	SPM, Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	Denise Breen	(732) 417-5814	QAPP approval dialogue
Health and Safety On-Site Meeting	HSO, Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	Sam Cheek	(469) 666-5585	Explain/review site hazards, personnel protective equipment, hospital location, etc.

EPA – U.S. Environmental Protection Agency
HSO – Health and Safety Officer
QA – Quality Assurance
QAPP – Quality Assurance Project Plan
START – Superfund Technical Assessment and Response Team
SPM – Site Project Manager
WAM – Work Assignment Manager

QAPP Worksheet #7: Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Andrew Fessler	EPA WAM/Task Monitor	EPA, Region 2	All project coordination, direction and decision making.	NA
Denise Breen	SPM, Technical Reviewer, START Region 5, TO13 (Region 2 SAT)	Weston Solutions, Inc.	Implementing and executing the technical, QA and health and safety during sampling event and sample collection and management	2 years*
Jeff Lynes	Field Personnel, SMO, START Region 5, TO13 (Region 2 SAT)	Weston Solutions, Inc.	Sample collection and management	9 years*
Sam Cheek	Field Personnel, Data Review START Region 5, TO13 (Region 2 SAT)	Weston Solutions, Inc.	Sample collection and management; data review	6 years*
TBD	Field Personnel, START Region 5, TO13 (Region 2 SAT)	Weston Solutions, Inc.	Oversight by Certified Health Physicist (CHP); data review	TBD

*All START Region 5, TO13 (Region 2 SAT) members' resumes are in possession of START Region 5, TO13 (Region 2 SAT) Program Manager, EPA Project Officer, and Contracting Officers.

QAPP Worksheet #8: Special Personnel Training Requirements Table

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel / Groups Receiving Training	Personnel Titles / Organizational Affiliation	Location of Training Records / Certificates[1]
[Specify location of training records and certificates for samplers]						
QAPP Training	This training is presented to START Region 5 personnel to introduce the provisions, requirements, and responsibilities detailed in the UFP QAPP. The training presents the relationship between the site-specific QAPPs, SOPs, work plans, and the Generic QAPP. QAPP refresher training will be presented to all employees following a major QAPP revision.	Weston Solutions, Inc., QAO	As needed	All START Region 5, TO13 (Region 2 SAT) field personnel upon initial employment and as refresher training	Weston Solutions, Inc.	Weston Solutions, Inc., EHS Database
Health and Safety Training	Health and safety training will be provided to ensure compliance with Occupational Safety and Health Administration (OSHA) as established in 29 CFR 1910.120.	Weston Solutions, Inc., HSO	Yearly at a minimum	All Employees upon initial employment and as refresher training every year	Weston Solutions, Inc.	Weston Solutions, Inc., EHS Database
Others	Scribe, ICS 100 and 200, and Air Monitoring Equipment Trainings provided to all employees	Weston Solutions, Inc., QAO/Group Leader's	Upon initial employment and as needed			
	Dangerous Goods Shipping	Weston Solutions, Inc., HSO	Every 2 years			

All team members are trained in the concepts and procedures in recognizing opportunities for continual improvement, and the approaches required to improve procedures while maintaining conformance with legal, technical, and contractual obligations.

[1] All START Region 5, TO13 (Region 2 SAT) members' certifications are in the possession of START Region 5, TO13 (Region 2 SAT) HSO.

QAPP Worksheet #9: Project Scoping Session Participants Sheet

Site Name/Project Name: Niagara Falls Boulevard
Site Location: 9540 Niagara Falls Boulevard, Niagara Falls, Niagara County, NY 14304
Operable Unit: 00
Date of Sessions: 10/24/2013
Scoping Session Purpose: To discuss questions, comments, and assumptions regarding technical issues involved with the investigation of the site.

Name	Title	Affiliation	Phone #	E-mail Address	*Project Role
Andrew Fessler	EPA WAM/Task Monitor	EPA, Region 2	(212) 637-4333	Fessler.Andrew@epa.gov	WAM/Task Monitor
Cathy Romano	Deputy Project Officer	EPA, Region 2	(212) 637-4339		
Mel Hauptman	Pre-Remedial Section Chief	EPA, Region 2	(212) 637-4338	hauptman.mel@epamail.epa.gov	
Denise Breen	Assistant Project Scientist	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	(732) 417-5814	Denise.Breen@westonsolutions.com	SPM
Nancy Shannon	Senior Project Scientist	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	(856) 793-2129	Nancy.shannon@westonsolutions.com	
Michele Capriglione	Principal Project Scientist	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	(732) 417-5808	m.capriglione@westonsolutions.com	Technical Reviewer
Gerry Gilliland	Senior Technical Manager	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	(732) 417-5826	Gerry.Gilliland@westonsolutions.com	QA Officer
Robert Schoenfelder	Certified Health Physicist	Weston Solutions, Inc., START Region 5, TO13 (Region 2 SAT)	(505) 837-6556	R.Schoenfelder@westonsolutions.com	Data Review

Comments/Decisions: As part of the Preliminary Assessment/Site Inspection (PA/SI), Weston Solutions, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START) Region 5 is tasked under TO13 (Region 2 SAT) with the collection of slag and soil samples from the Niagara Falls Boulevard site (the NFB site). Sampling will include the collection of approximately three slag and fourteen soil samples collected from the zone beneath asphalt (including one Quality Assurance/Quality Control [QA/QC] soil sample). Two additional soil samples will be collected to document background conditions from locations outside the areas impacted by the slag. Sampling will tentatively take place December 2013. The samples will be collected to determine the concentrations of radionuclides in slag and soil present on the site. The slag and soil samples will be submitted to the TestAmerica for Isotopic Thorium, Isotopic Uranium, Radium-226, Radium-228, and gamma spectroscopy analysis, and the soil samples will also be analyzed for Target Analyte List (TAL) Inorganics including mercury. The slag and soil samples will be collected for a definitive data QA Objective. Field duplicate and Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be collected at a rate of one per twenty soil samples where applicable. The investigation will also include gamma radiation screening and collection of radon/thoron gas measurements.

Action Items: The CLP Request Form will be submitted by WESTON Region 2 SAT personnel for laboratory procurement in November 2013 [Region 2 SAT submitted the form and EPA responded that WESTON should subcontract the laboratory – TestAmerica Inc., St. Louis, MO is the chosen subcontractor].

Sampling at the site will tentatively take place December 2013.

Consensus Decisions: Conduct hollow-stem auger (HSA) drilling in source and background areas to retrieve three slag samples and sixteen soil samples, and to determine approximate extent and thickness of slag.

QAPP Worksheet #10: Problem Definition

PROBLEM DEFINITION

The NFB site is located in a mixed commercial and residential area of Niagara Falls, New York, as shown on Figures 1 and 2 in Attachment A. The site consists of two parcels, namely 9524 and 9540 Niagara Falls Boulevard, and encompasses approximately one acre. Currently, the 9540 Niagara Falls Boulevard property contains a vacant building and an asphalt parking lot; the 9524 Niagara Falls Boulevard property contains a bowling alley and an asphalt parking lot. Available information documents that radioactive slag containing uranium-238, thorium-232, and radium-226 is present on site and is releasing radioactivity into the environment; its presence may potentially affect on-site workers, the general population who frequent the property for recreation, and the nearby residential population. The PA/SI is being conducted to characterize horizontal and vertical extent of the slag and associated soil contamination, and to evaluate potential releases associated with the NFB site.

SITE HISTORY/CONDITIONS

In 1978, the U.S. Department of Energy (DOE) conducted an aerial radiological survey of the Niagara Falls region. More than 15 properties were identified as having elevated levels of radiation above background levels. It is believed that, in the early 1960s, slag from the Union Carbide facility located on 47th Street in Niagara Falls was used as fill on the properties prior to paving. The Union Carbide facility processed ore containing naturally-occurring high levels of uranium and thorium to extract niobium. The slag contained sufficient quantities of uranium and thorium to be classified as a licensable radioactive source material. Union Carbide subsequently obtained a license from the Atomic Energy Commission, now the Nuclear Regulatory Commission (NRC), and the State of New York; however, the slag had been used as fill throughout the Niagara Falls region prior to licensing. Based on the original survey and subsequent investigations, it is believed that the radioactive Union Carbide slag was deposited on the 9540 Niagara Fall Boulevard site.

In April and May 1979, the New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) conducted a radiological survey of the interior of the buildings and in the parking lots of the NFB site; they also collected samples of the slag. The highest radiation level detected in the interior of the buildings was 100 microroentgens per hour (μR/hr). Radiation levels in the parking lots ranged between 200 and 500 μR/hr. Analytical results of the slag samples showed approximate uranium-238 concentrations of 1,010 picocuries per gram (pCi/g), approximate thorium-232 concentrations of 840 pCi/g, and approximate radium-226 concentrations of 205 pCi/g. A risk analysis and evaluation of alternative actions were conducted based on the findings. NYSDOH concluded that the continuing use of both properties did not pose a hazard to either the general public or on-site workers. NYSDOH instructed the property owners to maintain the surface of the parking lot and notify them if the property is sold or the parking lot is disturbed.

In September/October 2006 and May 2007, NYSDEC conducted radiological surveys of the interior and exterior of both properties on several occasions using both an Exploranium-135 and Ludlum 2221. With the exception of an office area and storage space at 9540 Niagara Falls Boulevard that was constructed directly on top of the asphalt parking lot after the original building, interior radiation levels were relatively low. The highest reading in the newer area was 115 μR/hr; elsewhere throughout the building, radiation levels generally ranged between 10 and 20 μR/hr. Exterior readings taken at waist height generally ranged between 10 and 350 μR/hr, while the maximum reading of 600 μR/hr was recorded on contact (i.e., at the ground surface). At a fenced area behind the 9540 Niagara Falls Boulevard building, waist-high readings ranged between 200 and 450 μR/hr, and on-contact readings ranged between 450 and 750 μR/hr. Elevated readings were also observed on the swath of grass between the 9524 Niagara Falls Boulevard property and the adjacent property to the west that contains a hotel, and in the marshy area beyond the parking lot behind the buildings. Two biased samples of slag were collected from locations that exhibited elevated static Ludlum readings: one sample was collected from an area of loose blacktop that indicated readings of 515,905 counts per minute (cpm) on the Ludlum, and one slag sample was collected in the marshy area that indicated readings of 728,235 cpm on the Ludlum. Analytical data for these samples were not found during the file review conducted at NYSDEC or in the NYSDOH files provided to Region 2 SAT.

In February 2008, NYSDEC collected two samples of slag from the 9540 Niagara Falls Boulevard property and one sample from the 9524 Niagara Falls Boulevard property. The samples were submitted for oxide analysis and elemental analysis; the samples were not submitted for radiological analysis. The analytical results indicated that the material contained small amounts of rare earth elements such as zirconium. In 2010 and 2011, NYSDEC was on site at the 9524 Niagara Falls Boulevard property to provide monitoring and oversight during the removal of a flower bed and excavation of an area due to an underground water main break.

In July 2013, NYSDEC conducted a radiological survey of the exterior of both properties using a sodium iodide (NaI) 2x2 gamma radiation meter and a Victoreen pressurized ion chamber (PIC) radiation meter. An area of broken asphalt showed radiation levels up to 200 μR/hr. An overgrown fenced area containing a soil pile with visible slag behind 9540 Niagara Falls Boulevard showed levels up to 500 μR/hr on the PIC radiation meter and over 600,000 cpm on the gamma radiation meter. NYSDEC observed empty beer cans and old tires positioned as seats in this portion of the site, indicating that areas of contamination are readily accessible to the public.

The properties are bordered to the north by a wooded area, to the east by a church, to the south by Niagara Falls Boulevard and a residential area, and to the west by a hotel and residential area. There are an estimated 7,170 residents within 1 mile of the site and an estimated 51,488 residents within 4 miles of the site. The site is located approximately 1.7 miles north of the Niagara River. There are not known to be any public or domestic groundwater wells utilized for drinking water within a 4-mile radius of the site. The population within a 4-mile radius of the site receives its drinking water supply from the Niagara Falls Water Board, whose source of water is the Niagara River. There are 4 or 5 workers on site.

PROJECT DESCRIPTION

In order to characterize on-site slag and soils, Region 2 SAT will collect slag and soil samples. Slag sampling will include the collection of three slag samples. Soil sampling will include the collection of 14 soil samples from the 0-6 inch interval beneath slag observed on-site, including one QA/QC sample. Two additional samples will be collected to document background conditions from locations outside of the areas impacted by the slag. Figure 4 in Attachment A shows the proposed sample locations.

A hollow-stem auger drill rig will be used to evaluate the vertical extent of the slag. At each location, a soil sample will be collected from the zone just below the layer of slag using a split-spoon sampling device. Region 2 SAT will use a gamma scintillation detector such as a Ludlum 2221 Scaler Ratemeter, which measures the amount of gamma radiation in counts per minute (cpm), to aid in determining sample locations. The three slag samples will represent the highest levels of gamma radiation at the Site (generally greater than 200,000 cpm for this site, based on screening data) as measured by the gamma radiation meter during the 2013 reconnaissance. Background soil samples will be collected from locations suspected to not have been impacted by the slag fill at the site and which exhibit background gamma radiation levels (generally <9,000 cpm). Soil will be obtained and homogenized with disposable polyethylene scoops. The slag and soil samples will also be analyzed by an off-site laboratory for Isotopic Thorium, Isotopic Uranium, Radium-226, and Radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy. The soil samples will also be analyzed for TAL Inorganics.

Region 2 SAT will also delineate the area of observed contamination by measuring the gamma radiation exposure rates within the source area and at background locations. In accordance with Hazard Ranking System (HRS) requirements for naturally-occurring radionuclides, areas of observed contamination are defined by site-attributable radionuclide concentrations that equal or exceed a value two standard deviations above the mean site-specific background concentration or by gamma radiation exposure rates, measured by a survey instrument (e.g., pressurized ion chamber [PIC]) held one meter above ground surface, that equal or exceed two times the site-specific background gamma radiation exposure rate obtained with the same type of instrument.

In order to evaluate possible observed release to the air migration pathway, Region 2 SAT will take Radon-220 (a.k.a Thoron) and Radon-222 measurements at and near the source area and at background locations using a RAD7 Radon Detector. Thoron is a gaseous (i.e. vapor pressure ≥ 10^{-9} Torr) radioactive isotope progeny of Thorium-232 and Radon-222 is a gaseous radioactive progeny of Uranium-238. The pre-calibrated RAD7 detectors will be set up to run for 4 hours at each location with a measurement recorded every hour. The sample inlet will be set 3 feet above the ground surface, and the sample will flow through a 6-inch long drying tube filled with desiccant, through a 3-foot long vinyl hose, through an inlet particulate filter, and into the RAD7 instrument. Details on the procedure for evaluating the possible observed release to the air migration pathway using a RAD7 Radon Detector can be found on Worksheets 14. In accordance with HRS, the observed release to the air migration pathway is defined by site-attributable radionuclide concentrations that equal or exceed a value two standard deviations above the mean site-specific background concentration.

The site work is scheduled to begin in December 2013.

QAPP Worksheet #10: Problem Definition (Concluded)

OBSERVATION FROM ANY SITE RECONNAISSANCE REPORT

On September 10, 2013, WESTON Region 2 SAT conducted a radiological survey of the 9524 Niagara Falls Boulevard property using a Ludlum 2221 Scaler Ratemeter. [The property owner of 9540 Niagara Falls Boulevard did not grant access; therefore, the radiological survey did not include that property.] Beginning at the western corner of the property at Niagara Falls Boulevard and the adjacent hotel, WESTON began walking transects at 3-foot intervals measuring gamma radiation levels at waist height. Gamma readings along the grass swath between the 9524 Niagara Falls Boulevard property and the hotel property ranged from 20,000 to 30,000 cpm, and steadily increased to between 40,000 and 50,000 cpm as WESTON proceeded onto the asphalt. By the time WESTON reached the middle of the parking lot in front of the building, radiation levels were consistently over 100,000 cpm. Radiation levels measured on the concrete walkway directly in front of the building were generally below 20,000 cpm. Radiation levels detected while surveying the parking lot on the east side of the building adjacent to 9540 Niagara Falls Boulevard were consistently between 150,000 and 175,000 cpm, and the levels detected at the parking lot behind (i.e., north) of the building were consistently between 180,000 and 190,000 cpm. WESTON surveyed an area of broken asphalt in the rear parking lot; radiation levels ranged from 200,000 to 300,000 cpm. Radiation levels along the edge of the parking lot and overgrown brush area behind the building ranged between 30,000 and 40,000 cpm.

WESTON also surveyed gamma radiation levels inside the building. Radiation levels at the back entrance were around 25,000 cpm. Once inside the building, levels ranged between 6,000 and 10,000 cpm. The property owner stated that the whole back area (e.g., the lockers, arcade area, and small bowling store) was raised 2 feet with concrete, and that the radiation levels inside the building in this area were greatly reduced as a result. The storage area behind the alley registered levels between 7,000 and 8,000 cpm. The side entranceway, which also had additional concrete added, had radiation levels between 10,000 and 14,000 cpm.

Figure 3 in Attachment A depicts the gamma radiation levels of the exterior portion of the property detected during the survey.

PROJECT DECISION STATEMENTS

EPA will use the radiological measurements and analytical data from this investigation to document areas of observed contamination at the NFB site for evaluation of the soil exposure pathway, and to evaluate the likelihood-of-release factor in the air migration pathway.

QAPP Worksheet #11: Project Quality Objectives/Systematic Planning Process Statement

Overall project objectives include: Determine if on-site slag and soils contain elevated concentrations of radionuclides by laboratory analysis and by measuring gamma radiation exposure rates using a PIC survey instrument. To determine if the soils are emitting thoron or radon gas by capturing real-time measurements with a RAD7 Detector.

Who will use the data? Data will be used by the EPA Region 2 WAM/Task Monitor.

What will the data be used for? The data will be used to delineate area(s) of observed contamination for evaluation of the soil exposure pathway, and to evaluate possible observed releases of radioactive materials to the air migration pathway.

* In accordance with Hazard Ranking System (HRS) requirements for naturally-occurring radionuclides, areas of observed contamination are defined by site-attributable radionuclide concentrations that equal or exceed a value two standard deviations above the mean site-specific background concentration or by gamma radiation exposure rates, measured by a survey instrument (e.g., pressurized ion chamber [PIC]) held one meter above ground surface, that equal or exceed two times the site-specific background gamma radiation exposure rate obtained with the same type of instrument..

What types of data are needed?

Matrix:	Slag and soil samples and air measurements
Type of Data:	Definitive data for slag and soil samples; quantitative for air measurements
Analytical Techniques:	Off-site laboratory analyses for slag and soil samples; Field survey equipment (RAD7 Radon Detector) for air measurements
Parameters:	TAL Metals (soil only); Isotopic Thorium, Isotopic Uranium, Radium-226, and Radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy for slag and soil samples; Thoron and Radon gases for air measurements
Type of sampling equipment:	HSA drill rig, split-spoon samplers, plastic scoops, aluminum trays, and sample jars for slag and soil; RAD7 Radon Detector for air
Access Agreement:	Partial access granted by property owner the remainder of access is pending a property sale.
Sampling locations:	The soil samples will be collected from locations that exhibit the highest levels of gamma radiation (generally > 200,000 cpm for this site) as measured by the gamma radiation meter. Air measurements using the RAD7 will be collected from source areas, outside the source area, and from background locations.

How much data are needed? Three slag and sixteen soil samples (including one soil duplicate and two background soil samples) are anticipated to be collected. The background soil samples will be collected off-site from locations not suspected to have been impacted by slag placement on the property. The samples will be submitted for laboratory analysis.

The area(s) of observed contamination will be delineated by measuring the gamma radiation exposure rates within the source area and at background locations using a PIC survey instrument. Air measurements will be taken from the source area, from areas outside but nearby the source, and from background locations. Duplicate measurements will be collected for QA/QC purposes.

How "good" does the data need to be in order to support the environmental decision?
Refer to Worksheet #12, criteria for performance measurement for definitive data.

Where, when, and how should the data be collected/generated? The slag and soil samples to be collected from the site and associated radiological measurements have been discussed with the EPA WAM. All samples will be collected using methods outlined in the Standard Operating Procedures (SOP). The sampling event is scheduled to begin in December 2013.

Who will collect and generate the data? The samples and radiological measurements will be collected by WESTON Region 2 SAT personnel. Samples will be analyzed by the assigned laboratory and reviewed by WESTON personnel.

How will the data be reported? All data will be reported by the assigned laboratory. The SPM will provide a Sampling Trip Report (STR) with Maps/Figures and PA/SI Report to the EPA WAM.

How will the data be archived? Electronic data deliverables (EDD) will be archived and delivered to the EPA WAM on compact disc.

QAPP Worksheet #12A: Measurement Performance Criteria Table

Complete this worksheet for each matrix, analytical group, and concentration level. Identify the data quality indicators (DQI), measurement performance criteria (MPC) and QC sample and/or activity used to assess the measurement performance for both the sampling and analytical measurement systems. Use additional worksheets if necessary. If MPC for specific DQI vary within an analytical parameter, i.e., MPC are analyte-specific, then provide analyte-specific MPC on an additional worksheet.

Matrix	Soil[1]/Aqueous[2]
Analytical Group	TAL Metals
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	SW846, Method 6010B	Precision (field)	±35 % D	Field Duplicate	S & A
		Accuracy (field)	No analyte > CRQL	Field Blank	S & A
		Precision (laboratory)	±20 % RPD (Aqueous) ±30 % RPD (Soil) 75 – 125 %	Lab Duplicate; MS/MSD	S & A
		Accuracy (Laboratory)	80 – 120 % (Aqueous) SRM Limits (Soil)	LCS	A
		Accuracy (laboratory)	No analyte > CRQL	Lot Blank	S & A
		Precision (laboratory)	10% RPD	Serial Dilution	A

1 Reference number from QAPP Worksheet #2 & #23

2 Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #12: Measurement Performance Criteria Table (continued)

Matrix	Slag/Soil[1]
Analytical Group	Isotopic Thorium
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	Alpha Spectrometry, HASL-300, or equivalent	Precision	% RPD < 40; RER <1%	Sample Duplicate	A
		Accuracy	Limits: Recovery Th-228: 70-130% Th-230: 81-118% Th-232: 70-130%	LCS	A
		Accuracy	< MDC	Method Blank	A

QAPP Worksheet #12: Measurement Performance Criteria Table (continued)

Matrix	Aqueous[2]
Analytical Group	Isotopic Thorium
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	Alpha Spectrometry, HASL-300, or equivalent	Precision	% RPD < 40; RER <1%	Sample Duplicate	A
		Accuracy	Limits: Recovery Th-228: 70-130% Th-230: 81-125% Th-232: 70-130%	LCS	A
		Accuracy	< MDC	Method Blank	A

QAPP Worksheet #12: Measurement Performance Criteria Table (continued)

Matrix	Slag/Soil[1]
Analytical Group	Isotopic Uranium
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	Alpha Spectrometry, HASL-300, or equivalent	Precision	% RPD < 40; RER <1%	Sample Duplicate	A
		Accuracy	Limits: Recovery U-234: 84-120% U-238: 82-122%	LCS	A
		Accuracy	< MDC	Method Blank	A

QAPP Worksheet #12: Measurement Performance Criteria Table (continued)

Matrix	Aqueous[2]
Analytical Group	Isotopic Uranium
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	Alpha Spectrometry, HASL-300, or equivalent	Precision	% RPD < 40; RER <1%	Sample Duplicate	A
		Accuracy	Limits: Recovery U-234: 84-120% U-238: 83-121%	LCS	A
		Accuracy	< MDC	Method Blank	A

QAPP Worksheet #12: Measurement Performance Criteria Table (continued)

Matrix	Aqueous[2]
Analytical Group	Ra-226, and Ra-228
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	Gas Flow Proportional Counter, SW846 9315/9320	Precision	% RPD < 40; RER <1%	Sample Duplicate	A
		Accuracy	Limits: Recovery Ra-226: 68-137% Ra-228: 56-140%	LCS	A
		Accuracy	< MDC	Method Blank	A

QAPP Worksheet #12: Measurement Performance Criteria Table (continued)

Matrix	Slag/Soil[1]
Analytical Group	Radioisotopes by Gamma Spectrometry
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	HASL-300 or equivalent	Precision	% RPD < 40; RER <1%	Duplicate	A
		Accuracy	Limits: Recovery Am-241: 87-116% Cs-137: 87-120% Co-60: 87-115%	LCS	A
		Accuracy	< MDC	Method Blank	A

Matrix	Aqueous[2]
Analytical Group	Radioisotopes by Gamma Spectrometry
Concentration Level	Low/Medium

Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
SOP # 2012	HASL-300 or equivalent	Precision	% RPD < 40; RER <1%	Duplicate	A
		Accuracy	Limits: Recovery Am-241: 90-111% Cs-137: 90-111% Co-60: 89-110%	LCS	A
		Accuracy	< MDC	Method Blank	A

QAPP Worksheet #13: Secondary Data Criteria and Limitations Table

Any data needed for project implementation or decision making that are obtained from non-direct measurement sources such as computer databases, background information, technologies and methods, environmental indicator data, publications, photographs, topographical maps, literature files and historical data bases will be compared to the DQOs for the project to determine the acceptability of the data. Thus, for example, analytical data from historical surveys will be evaluated to determine whether they satisfy the validation criteria for the project and to determine whether sufficient data was provided to allow an appropriate validation to be done. If not, then a decision to conduct additional sampling for the site may be necessary.

Secondary Data	Data Source (Originating Organization, Report Title, and Date)	Data Generator(s) (Originating Org., Data Types, Data Generation/ Collection Dates)	How Data May Be Used (if deemed usable during data assessment stage)	Limitations on Data Use
EPA Investigation	Reconnaissance screening event – September 2013.	Weston Solutions (START Region 5)	To determine possible areas of observed contamination.	Screening-level data

QAPP Worksheet #14: Summary of Project Tasks

Sampling Tasks:

In order to characterize on-site slag and soils, Region 2 SAT will collect slag and soil samples. Slag sampling will include the collection of three slag samples. Soil sampling will include the collection of 14 soil samples from the 0-6 inch interval beneath slag observed on-site, including one QA/QC sample. Two additional samples will be collected to document background conditions from locations outside of the areas impacted by the slag. Figure 4 in Attachment A shows the proposed sample locations.

A hollow-stem auger drill rig will be used to evaluate the vertical extent of the slag. At each location, a soil sample will be collected from the zone just below the layer of slag using a split-spoon sampling device. Region 2 SAT will use a gamma scintillation detector such as a Ludlum 2221 Scaler Ratemeter, which measures the amount of gamma radiation in counts per minute (cpm), to aid in determining sample locations. The three slag samples will represent the highest levels of gamma radiation at the Site (generally greater than 200,000 cpm for this site, based on screening data) as measured by the gamma radiation meter during the 2013 reconnaissance. Background soil samples will be collected from locations suspected to not have been impacted by the slag fill at the site and which exhibit background gamma radiation levels (generally <9,000 cpm). Soil will be obtained and homogenized with disposable polyethylene scoops. The slag and soil samples will also be analyzed by an off-site laboratory for Isotopic Thorium, Isotopic Uranium, Radium-226, and Radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy. The soil samples will also be analyzed for TAL Inorganics.

Region 2 SAT will also delineate the area of observed contamination by measuring the gamma radiation exposure rates within the source area and at background locations. In accordance with HRS requirements for naturally-occurring radionuclides, areas of observed contamination are defined by site-attributable radionuclide concentrations that equal or exceed a value two standard deviations above the mean site-specific background concentration or by gamma radiation exposure rates, measured by a survey instrument (e.g., pressurized ion chamber [PIC]) held one meter above ground surface, that equal or exceed two times the site-specific background gamma radiation exposure rate obtained with the same type of instrument.

In order to evaluate possible observed release to the air migration pathway, Region 2 SAT will take Radon-220 (a.k.a Thoron) and Radon-222 measurements at and near the source area and at background locations using a RAD7 Radon Detector. Thoron is a gaseous (i.e. vapor pressure ≥ 10^{-9} Torr) radioactive isotope progeny of Thorium-232 and Radon-222 is a gaseous radioactive progeny of Uranium-238. In accordance with HRS, the observed release to the air migration pathway is defined by site-attributable radionuclide concentrations that equal or exceed a value two standard deviations above the mean site-specific background concentration.

The RAD7 instrumentation setup and sampling procedure will be as follows:

- The RAD7 will be purged for a period of ten minutes at a location that is known to have 1 pCi/L or less of either radon-220 or radon-222 before each sampling period.

• The RAD7 will be established at one of the specified locations based on wind rose diagrams depicting dominant wind patterns for the month of December to be from the west-southwest.

• The instrument will be programmed with the following settings: Protocol – User, Cycle –01:00, Recycle – 4, Mode – Auto, Thoron – On, Pump – Auto, Tone – Geiger, Format –Short, and Units – pCi/l and °C; whereas the instrument will be set to record a measurement for radon-220 and radon-222 once an hour for a period of four hours. The printer will give a real-time read out of the measurements every hour and will also store the data on the unit for download after the test is complete.

• A tripod will be used to set the sample inlet 3-feet above the ground surface. The sample will flow through a 6-inch long drying tube filled with desiccant, through a 3-foot long vinyl hose, through an inlet particulate filter, and into the RAD7 instrument.

• The instrument will automatically run for a 4 hour period. The sampler will pause the run to change out the desiccant as needed. The sampler will also pause the run if there is any precipitation. If precipitation is heavy and consistent, the run will be terminated.

• The following information will be recorded on the field data sheet (refer to Attachment B, Field Data Sheet) for each sampling location at the beginning of sampling: RAD7 serial number, location ID, location cross streets and descriptions, date, the sampler's name, current date and time, user settings (current date and time, protocol, cycle, recycle, mode, and thoron on/off), and initial weather (*i.e.,* cloud coverage, temperature, wind direction, wind speed, UV index, dew point, humidity, and pressure). All weather information will be gathered using the Weather Channel application for the iPhone which will be set for Ridgewood, Queens, New York. Variations in what the application presents and what the sampler can visually assess, such as cloud cover, will be noted.

• The following information will be recorded on the field data sheet every hour: weather from the Weather Channel application, weather from the RAD7 print out (temperature and relative humidity), radon-220 reading, and radon-222 reading.

• Anytime that the desiccant tube needs to be changed, the time will be recorded on the Field Data Sheet.

• At the end of the run, the data will be downloaded for that run and the instrument will be purged for 10 minutes (if the readings for radon-220 and radon-222 at the current location were below 1 pCi/L) before moving to the next location.

QAPP Worksheet #14: Summary of Project Tasks (Continued)

Decontamination:

Decontamination of non-disposable sampling equipment, including Geoprobe cutting shoes, will be performed before and after the sampling event and between sample locations, and will consist of the following steps:

1. Soap and water scrub.
2. Tap water or deionized (DI) water rinse.
3. Steam-clean with DI water.
4. Air dry.
5. Screen with radiation meter for residual contamination.
6. Foil wrap if not immediately re-used.

The decontamination fluid will be discarded at locations that indicate the highest levels of contamination (based on radiation meter screening) such that runoff will not occur.

Analysis Tasks:

Slag/Soil – TAL Metals analysis (soil only)
Isotopic Thorium, Isotopic Uranium, Radium-226, and Radium-228, gamma radiation analysis
Air - Thoron/Radon gas measurements

Quality Control Tasks:

The slag and soil samples will be collected for definitive data QA objective. Field duplicate and MS/MSD samples will be collected at a rate of one per twenty soil samples, as applicable. Duplicate thoron and radon gas measurements will be collected at two of six measurement locations.

Data Management Tasks:

Activities under this project will be reported in status and trip reports and other deliverables (e.g., analytical reports, final reports) described herein. Activities will also be summarized in appropriate format for inclusion in monthly and annual reports.

The following deliverables will be provided under this project:

Trip Report: A trip report will be prepared to provide a detailed accounting of what occurred during the sampling event. The trip report will be prepared within two weeks of the last day of each sampling mobilization. Information will be provided on time of major events, dates, and personnel on-site (including affiliations).

QAPP Worksheet #14: Summary of Project Tasks (Continued)

Maps/Figures: Maps depicting site layout and sample locations will be included in the trip report, as appropriate.

PA/SI Report: A complete PA/SI report will be prepared for samples analyzed under this plan. This is to be provided within 60 days after receiving validated data. The PA/SI incorporates existing and new data into an evaluation of the site.

Documentation and Records:

All sample documents will be completed legibly, in ink. Any corrections or revisions will be made by lining through the incorrect entry and by initialing the error.

Field Logbook: The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. Field logbook will be bound and paginated. All entries will be dated and signed by the individuals making the entries, and should include (at a minimum) the following

1. Site name and project number
2. Name(s) of personnel on-site
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Sample and sample location identification and description*
9. Subcontractor information and names of on-site personnel
10. Date and time of sample collections, along with COC information
11. Record of photographs
12. Site sketches

* The description of the sample location will be noted in such a manner as to allow the reader to reproduce the location in the field at a later date.

Sample Labels: Sample labels will clearly identify the particular sample, and should include the following:

1. Site/project number.
2. Sample identification number.
3. Sample collection date and time.
4. Designation of sample (grab or composite).
5. Sample preservation.
6. Analytical parameters.
7. Name of sampler.

QAPP Worksheet #14: Summary of Project Tasks (Continued)

Sample labels will be written in indelible ink and securely affixed to the sample container. Tie-on labels can be used if properly secured.

Custody Seals: Custody seals demonstrate that a sample container has not been tampered with or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook.

Assessment/Audit Tasks: No performance audit of field operations is anticipated at this time. If conducted, performance and system audit will be in accordance with the project plan.

Data Review Tasks: All data will be reviewed and validated by WESTON.

Definitive data projects: The data generated under this QA/QC Sampling Plan will be evaluated according to guidance in the Uniform Federal Policy for Implementing Environmental Quality Systems: Evaluating, Assessing and Documenting Environmental Data Collection and Use Programs Part 1: UFP-QAPP (EPA-505-B-04-900A, March 2005); Part 2B: Quality Assurance/Quality Control Compendium: Minimum QA/QC Activities (EPA-505-B-04-900B, March 2005).

Laboratory analytical results will be assessed by the data reviewer for compliance with required precision, accuracy, completeness, representativeness, and sensitivity.

QAPP Worksheet #15: Reference Limits and Evaluation Table

Analyte	CAS Number	EPA Generic SSL Ingestion (mg/kg)**	Project Quantitation Limit	Method CRQLs (mg/kg)	Achievable Laboratory (TestAmerica) Limits MDLs (mg/kg)	RLs (mg/kg)
Aluminum	7429-90-5	NS	NS	20	14.0	20.0
Antimony	7440-36-0	31	NS	6	0.64	1.0
Arsenic	7440-38-2	0.4	NS	1	0.32	1.0
Barium	7440-39-3	5,500	NS	20	0.25	5.0
Beryillum	7440-41-7	160	NS	0.5	0.17	0.50
Cadmium	7440-43-9	70	NS	0.5	0.10	0.50
Calcium	7440-70-2	NS	NS	500	13.3	250
Chromium	7440-47-3	230	NS	1	0.31	1.0
Cobalt	7440-48-4	NS	NS	5	0.94	5.0
Copper	7440-50-8	NS	NS	2.5	0.73	2.5
Iron	7439-89-6	NS	NS	10	2.97	10.0
Lead	7439-92-1	400	NS	1	0.17	1.0
Magnesium	7439-95-4	NS	NS	500	8.31	100
Manganese	7439-96-5	NS	NS	1.5	0.15	1.0
Nickel	7440-02-0	1,600	NS	4	0.22	4.0
Potassium	7440-09-7	NS	NS	500	337	500
Selenium	7782-49-2	390	NS	3.5	0.29	1.5
Silver	7440-22-4	390	NS	1	0.23	1.0
Sodium	7440-23-5	NS	NS	500	47.1	100
Thallium	7440-28-0	6	NS	2.5	1.51	2.0
Vanadium	7440-62-2	550	NS	5	1.26	5.0
Zinc	7440-66-6	23,000	NS	6	1.98	5.0
Mercury	7440-31-5	NS	NS	-	0.011	0.033

NS – Not Specified
* MDL study cannot be successfully performed on these analytes because of high background levels in matrix (sand).
** U.S. Environmental Protection Agency (EPA). Generic Soil Screening Levels (SSL) for Residential Scenario, Ingestion-Dermal. Accessed at http://www.epa.gov/superfund/health/conmedia/soil/index.htm, March 2013.

QAPP Worksheet #15: Reference Limits and Evaluation Table (continued)

Analyte	CAS Number	EPA Generic SSL Ingestion (ug/L)**	Project Quantitation Limit	Method CRQLs (ug/L)	Achievable Laboratory (TestAmerica) Limits MDLs (ug/L)	RLs (ug/L)
Aluminum	7429-90-5	-	-	-	79.9	200
Antimony	7440-36-0	-	-	-	3.97	10.0
Arsenic	7440-38-2	-	-	-	1.97	10.0
Barium	7440-39-3	-	-	-	3.95	50.0
Beryillum	7440-41-7	-	-	-	0.61	5.0
Cadmium	7440-43-9	-	-	-	0.91	5.0
Calcium	7440-70-2	-	-	-	106	1000
Chromium	7440-47-3	-	-	-	3.14	10.0
Cobalt	7440-48-4	-	-	-	4.92	50.0
Copper	7440-50-8	-	-	-	4.55	25.0
Iron	7439-89-6	-	-	-	28.2	100
Lead	7439-92-1	-	-	-	1.50	10.0
Magnesium	7439-95-4	-	-	-	132	1000
Manganese	7439-96-5	-	-	-	3.32	15.0
Nickel	7440-02-0	-	-	-	13.3	40.0
Potassium	7440-09-7	-	-	-	1650	5000
Selenium	7782-49-2	-	-	-	2.66	15.0
Silver	7440-22-4	-	-	-	5.95	10.0
Sodium	7440-23-5	-	-	-	324	1000
Thallium	7440-28-0	-	-	-	3.97	20.0
Vanadium	7440-62-2	-	-	-	4.06	50.0
Zinc	7440-66-6	-	-	-	5.15	20.0
Mercury	7440-31-5	-	-	-	0.060	0.20

NS – Not Specified
* MDL study cannot be successfully performed on these analytes because of high background levels in matrix (sand).
** U.S. Environmental Protection Agency (EPA). Generic Soil Screening Levels (SSL) for Residential Scenario, Ingestion-Dermal. Accessed at http://www.epa.gov/superfund/health/conmedia/soil/index.htm March 2013.

QAPP Worksheet #15: Reference Limits and Evaluation Table (continued)

Analyte	CAS Number	EPA Generic SSL Ingestion (pCi/g)**	Project Quantitation Limit	Method CRQLs (pCi/g)	Achievable Laboratory (TestAmerica) Limits MDLs (pCi/g)	RLs (pCi/g)
Thorium-228	7429-90-5	-	-	-	N/A	1.0
Thorium-230	7440-36-0	-	-	-	N/A	1.0
Thorium-232	7440-38-2	-	-	-	N/A	1.0
Uranium-234	7440-39-3	-	-	-	N/A	1.0
Uranium-235/236	7440-41-7	-	-	-	N/A	1.0
Uranium-238	7440-43-9	-	-	-	N/A	1.0
Radium-226	7440-70-2	-	-	-	N/A	1.0
Radium-228	7440-47-3	-	-	-	N/A	1.0

Analyte	CAS Number	EPA Generic SSL Ingestion (pCi/L)**	Project Quantitation Limit	Method CRQLs (pCi/L)	Achievable Laboratory (TestAmerica) Limits MDLs (pCi/L)	RLs (pCi/L)
Thorium-228	7429-90-5	-	-	-	N/A	1.0
Thorium-230	7440-36-0	-	-	-	N/A	1.0
Thorium-232	7440-38-2	-	-	-	N/A	1.0
Uranium-234	7440-39-3	-	-	-	N/A	1.0
Uranium-235/236	7440-41-7	-	-	-	N/A	1.0
Uranium-238	7440-43-9	-	-	-	N/A	1.0
Radium-226	7440-70-2	-	-	-	N/A	1.0
Radium-228	7440-47-3	-	-	-	N/A	1.0

NS – Not Specified
* MDL study cannot be successfully performed on these analytes because of high background levels in matrix (sand).
** U.S. Environmental Protection Agency (EPA). Generic Soil Screening Levels (SSL) for Residential Scenario, Ingestion-Dermal. Accessed at http://www.epa.gov/superfund/health/conmedia/soil/index.htm March 2013.

QAPP Worksheet #16: Project Schedule/Timeline Table

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Preparation of QAPP	WESTON START Region 5	10/24/2013	11/26/2013	QAPP	Prior to sampling date
Review of QAPP	WESTON START Region 5; EPA Region 2 WAM and QAO	11/26/2013	Prior to sampling date	Approved QAPP	TBD
Preparation of HASP	WESTON START Region 5	Prior to sampling date	TBD	HASP	TBD
Procurement of Field Equipment	WESTON START Region 5	Prior to sampling date	TBD	NA	NA
Laboratory Request	WESTON START Region 5	Prior to sampling date	TBD	Analytical Services Request Form	NA
Field Reconnaissance/Access	WESTON START Region 5; EPA Region 2 WAM and OSC	09/10/13	TBD	NA	NA
Collection of Field Samples	WESTON START Region 5	TBD	TBD	NA	NA
Sampling Trip Report	WESTON START Region 5	TBD	TBD	Sampling Trip Report	TBD
Laboratory Electronic Data Received	WESTON START Region 5	30 days from last sample receipt date	TBD	Preliminary Data	TBD
Laboratory Package Received	WESTON START Region 5	30 days from last sample receipt date	TBD	--	--
Validation of Laboratory Results	WESTON START Region 5	60 days from last sample receipt date	TBD	Validation Report	TBD
Data Evaluation/ Preparation of Final Report	WESTON START Region 5	TBD	TBD	Analytical Report	TBD

TBD – To be determined

QAPP Worksheet #17: Sampling Design and Rationale

In order to characterize on-site slag and soils, Region 2 SAT will collect slag and soil samples. Slag sampling will include the collection of three slag samples. Soil sampling will include the collection of 14 soil samples from the 0-6 inch interval beneath slag observed on-site, including one QA/QC sample. Two additional samples will be collected to document background conditions from locations outside of the areas impacted by the slag. Figure 4 in Attachment A shows the proposed sample locations.

A hollow-stem auger drill rig will be used to evaluate the vertical extent of the slag. At each location, a soil sample will be collected from the zone just below the layer of slag using a split-spoon sampling device. Region 2 SAT will use a gamma scintillation detector such as a Ludlum 2221 Scaler Ratemeter, which measures the amount of gamma radiation in counts per minute (cpm), to aid in determining sample locations. The three slag samples will represent the highest levels of gamma radiation at the Site (generally greater than 200,000 cpm for this site, based on screening data) as measured by the gamma radiation meter during the 2013 reconnaissance. Background soil samples will be collected from locations suspected to not have been impacted by the slag fill at the site and which exhibit background gamma radiation levels (generally <9,000 cpm). Soil will be obtained and homogenized with disposable polyethylene scoops. The slag and soil samples will also be analyzed by an off-site laboratory for Isotopic Thorium, Isotopic Uranium, Radium-226, and Radium-228 by alpha spectroscopy; and radioisotopes by gamma spectroscopy. The soil samples will also be analyzed for TAL Inorganics.

Region 2 SAT will also delineate the area of observed contamination by measuring the gamma radiation exposure rates within the source area and at background locations. In accordance with HRS requirements for naturally-occurring radionuclides, areas of observed contamination are defined by site-attributable radionuclide concentrations that equal or exceed a value two standard deviations above the mean site-specific background concentration or by gamma radiation exposure rates, measured by a survey instrument (e.g., pressurized ion chamber [PIC]) held one meter above ground surface, that equal or exceed two times the site-specific background gamma radiation exposure rate obtained with the same type of instrument.

In order to evaluate possible observed release to the air migration pathway, Region 2 SAT will take Radon-220 (a.k.a Thoron) and Radon-222 measurements at and near the source area and at background locations using a RAD7 Radon Detector. Thoron is a gaseous (i.e. vapor pressure ≥ 10^{-9} Torr) radioactive isotope progeny of Thorium-232 and Radon-222 is a gaseous radioactive progeny of Uranium-238. The pre-calibrated RAD7 detectors will be set up to run for 4 hours at each location with a measurement recorded every hour. The sample inlet will be set 3 feet above the ground surface, and the sample will flow through a 6-inch long drying tube filled with desiccant, through a 3-foot long vinyl hose, through an inlet particulate filter, and into the RAD7 instrument. Details on the procedure for evaluating the possible observed release to the air migration pathway using a RAD7 Radon Detector can be found on Worksheets 14. In accordance with HRS, the observed release to the air migration pathway is defined by site-attributable radionuclide concentrations that equal or exceed a value two standard deviations above the mean site-specific background concentration.

Field Sampling activities are scheduled to take place December 2013.

Slag/soil sampling

Sampling will be conducted as per EPA ERT Standard Operating Procedure (SOP) 2001 for General Field Sampling Guidelines. Slag samples will be accessed/retrieved with HAS drilling methods and will be collected upon visual characterization and radiological screening. Additionally, soil samples will be collected in accordance with EPA ERT SOP 2012 for Soil Sampling.

QAPP Worksheet #17: Sampling Design and Rationale (concluded)

The following laboratory will provide the analyses indicated:

Lab Name/Location	Sample Type	Parameters
TestAmerica Laboratories, Inc. (St. Louis Laboratory 13715 Rider Trail North St. Louis, MO 63045)	Slag, Soil, Aqueous	TAL Metals (soil and aqueous blanks only)
		Isotopic Thorium and Isotopic Uranium by alpha spectroscopy
		radioisotopes by gamma spectroscopy (includes Radium-226 and Radium-228)

Refer to Worksheet #21 for QA/QC samples, sampling methods, and SOPs.

QAPP Worksheet #18: Sampling Locations and Methods/SOP Requirements Table

Matrix	Sampling Location(s)	Units	Analytical Group(s)	Concentration Level	No. of Samples (identify field duplicates)	Sampling SOP Reference	Rationale for Sampling Location
Soil	To be Determined	mg/kg	TAL Metals	Low/Medium	16 (1)	SOP# 2001, 2012	Determine contaminants
Slag/Soil	To be Determined	pCi/g	Isotopic Thorium, Isotopic Uranium, Radium-226, and Radium-228 by alpha spectroscopy	Low/Medium	19 (1)	SOP# 2001, 2012	Determine contaminants
Slag/Soil	To be Determined	pCi/g	Radioisotopes by gamma spectroscopy	Low/Medium	19 (1)	SOP# 2001, 2012	Determine contaminants

The website for EPA-ERT SOPs is: http://www.ert.org/mainContent.asp?section=Products&subsection=List

QAPP Worksheet #19: Analytical SOP Requirements Table

Matrix	No. of Samples	Analytical Group [Lab Assignment]	Concentration Level	Analytical and Preparation Method/SOP Reference	Sample Volume	Containers (number, size, and type)	Preservation Requirements	Maximum Holding Time (preparation/ analysis)
Slag	3	Isotopic Thorium and Isotopic Uranium by Alpha Spec	Low/Medium	HASL 300 ST-RD-0210	5 grams	2-oz. glass jar	None	6 months
		radioisotopes by gamma spectroscopy (includes Ra-226/Ra-228	Low/Medium	HASL 300 ST-RD-0102	250 grams	16-oz. glass jar	None	6 months
Soil	16	TAL Metals	Low/Medium	SW846 6010C/ 7471B ST-MT-0003, ST-MT-0007	5 grams	2-oz. glass jar	Cool to 4^0 C	6 months
		Isotopic Thorium and Isotopic Uranium by Alpha Spec	Low/Medium	HASL 300 ST-RD-0210	5 grams	2-oz. glass jar	None	6 months
		radioisotopes by gamma spectroscopy (includes Ra-226/Ra-228	Low/Medium	HASL 300 ST-RD-0102	250 grams	16-oz. glass jar	None	6 months
Aqueous	2	TAL Metals	Low/Medium	SW846 6010C/ 7471B ST-MT-0003, ST-MT-0005	100 mLs	250 mL Plastic	HNO_3, Cool to 4^0 C	6 months
		Isotopic Thorium and Isotopic Uranium by Alpha Spec	Low/Medium	HASL 300 ST-RD-0210	1 Liter	1L Plastic	HNO_3	6 months
		radioisotopes by gamma spectroscopy	Low/Medium	HASL 300 ST-RD-0102	1 Liter	1L Plastic	HNO_3	6 months
		Radium-226/228	Low/Medium	SW846 9315/9320 ST-RD-0403	1 Liter	1L Plastic	HNO_3	6 months

QAPP Worksheet #20: Field Quality Control Sample Summary Table

Matrix	Analytical Group	Concentration Level	Analytical and Preparation SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs	No. of Extra Volume Laboratory QC (e.g., Duplicate) Samples[1]	No. of Rinsate Blanks[1]	No. of Trip. Blanks	No. of PE Samples
Soil	TAL Metals	Low/Medium	SW846 6010C/ 7471B ST-MT-0003, ST-MT-0007	16	1 per 20 samples	1 per 20 samples	1 per decon event	NR	NR
	Isotopic Thorium and Isotopic Uranium by alpha spectroscopy	Low/Medium	HASL 300 ST-RD-0210	16	1 per 20 samples	1 per 20 samples	1 per decon event	NR	NR
	Radioisotopes by gamma spectroscopy (includes Ra-226/228)	Low/Medium	HASL 300 ST-RD-0102	16	1 per 20 samples	1 per 20 samples	1 per decon event	NR	NR

[1] Only required if non-dedicated sampling equipment to be used.
NR – not required
TAL – target analyte list

QAPP Worksheet #21: Project Sampling SOP References Table

Reference Number	Title, Revision Date and/or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
SOP #2012	Soil Sampling; Rev. 0.0 February 2000	EPA/OSWER/ERT	plastic scoops, aluminum trays, and appropriate sample jars	N	--
SOP#2001	General Field Sampling Guidelines (all media); Rev. 0.0 August 1994	EPA/OSWER/ERT	Site Specific	N	--
SOP#2050	Geoprobe; Rev.0.1 March 2002	EPA/OSWER/ERT	Downhole tooling	N	--

Note: The website for EPA-ERT SOPs is: www.ert.org/mainContent.asp?section=Products&subsection=List

QAPP Worksheet #22: Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing/ Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Trimble® GeoXT™ handheld								
Ludlum® 2221 Scaler Ratemeter								
Pressurized ion chamber (PIC)								
RAD7 Radon Detector								

QAPP Worksheet #23: Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
ST-MT-0003	Inductively Coupled Plasma-Atomic Emission Spectroscopy method for Trace Element Analysis, Rev 22, 08/27/13	Definitive	TAL Metals	ICP-AES	TestAmerica St. Louis	N
ST-MT-0005	Preparation and Analysis of Mercury in Aqueous Samples by Cold Vapor Atomic Absorption, Rev 14, 08/07/13	Definitive	TAL Metals	CVAA	TestAmerica St. Louis	N
ST-MT-0007	Preparation and Analysis of Mercury in Solid Samples by Cold Vapor Atomic Absorption, Rev 14, 06/17/13	Definitive	TAL Metals	CVAA	TestAmerica St. Louis	N
ST-RD-0210	Alpha Spectroscopy Analysis, Rev. 11, 08/21/13	Definitive	Isotopic Thorium and Isotopic Uranium by alpha spectroscopy-	Alpha Spectrometry	TestAmerica St. Louis	N
ST-RD-0102	Gamma Vision Analysis, Rev. 11, 02/07/13	Definitive	Radioisotopes by gamma spectroscopy	Gamma Spectroscopy	TestAmerica St. Louis	N
ST-RD-0403	Low Background Gas Flow Proportional Counting System Analysis, Rev. 14, 09/12/13	Definitive	Radium-226/228 for aqueous samples	Gas Flow Proportional Counter	TestAmerica St. Louis	N

ICP-AES – Inductively coupled plasma – atomic emission spectroscopy
CVAA - Cold vapor atomic absorption technique

QAPP Worksheet #24: Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
ICP-AES	Initial Calibration (ICAL) – minimum one high standard and a calibration blank	Daily initial calibration prior to sample analysis	3 standards and a blank. Correlation Coefficient of ≥ 0.998	Recalibrate	TestAmerica Analyst	ST-MT-0003
ICP-AES	Second Source Calibration Verification (ICV)	Once after each initial calibration, prior to sample analysis	Value of second source for all analyte(s) within ± 10% of expected	Recalibrate	TestAmerica Analyst	ST-MT-0003
ICP-AES	Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence	All analytes within + 10% of expected value	Recalibrate – rerun 10 samples previous to failed CCV.	TestAmerica Analyst	ST-MT-0003
Cold Vapor AA	Initial Calibration (ICAL)	Daily initial calibration prior to sample analysis	Correlation coefficient R>=0.995 for linear regression	Recalibrate	TestAmerica Analyst	ST-MT-0005 ST-MT-0007
Cold Vapor AA	Second Source Calibration Verification (ICV)	Once after each initial calibration, prior to sample analysis	Value of second source for all analyte(s) within ± 10% of expected value (second source)	Recalibrate	TestAmerica Analyst	ST-MT-0005 ST-MT-0007
Cold Vapor AA	Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence.	All analytes within + 20% of expected value	Recalibrate – rerun 10 samples previous to failed CCV.	TestAmerica Analyst	ST-MT-0005 ST-MT-0007
Gas Flow Proportional Counter	• Plateau generation and/or verification • Discriminator	Annual	• Plot efficiencies vs masses • Calculate equation of curve – degree ≤3 • Remove outliers >15%	• Recalibrate • Instrument maintenance • Consult with Technical	TestAmerica Analyst	ST-RD-0403

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
	setting • Initial long background count • Mass attenuated efficiency calibration • Eight source dual/single calibration curves		deviation from theoretical values but not more than 20% of total points • Calculate coefficient of determination (R^2). R^2 must be ≥ 0.9 • Verify calibration with second source standard count – must be within 30 percent of true value and mean across all detectors <10%	Director		
Gamma Spectrometer	1. Energy calibration 2. Full width at half-maximum (FWHM) calibration	1. Annual 2. Annual	For Energy and FWHM calibration: • Within 0.5% or 0.1KeV for all calibration points • Within 8% for all calibration points • Verify with second source that always contains at least Am-241, Co-60, and Cs-137 • Must be ± 10%D for each nuclide	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica Analyst	STD-RD-0102
Alpha Spectrometer	1. Energy calibration 2. Efficiency calibration and background check 3. Subtraction spectrum, 4. Pulser check and background check	1. Monthly 2. Monthly 3. Monthly 4. Daily	1. Three isotopes in 3-6 MeV range all within ± 40 KeV of expected value 2. >20% 3. Ultra Low Level: < 2 CPM Low Level: < 2-4 CPM Routine Level: < 4-10 CPM	• Recalibrate • Instrument maintenance • Consult with Technical Director If background check is > 20 CPM, then detector requires	TestAmerica Analyst	ST-RD-0210

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1]
			High Level: < 10-20 CPM 4. Pulser energy, peak centroid, peak resolution, peak area, calibration and background must pass statistical "boundary" out-of-range test	maintenance		

[1] Specify the appropriate letter or number form the Analytical SOP References table (Worksheet #23)
CA – corrective action
DESA – Division of Environmental Science and Assessment
EPA – U.S. Environmental Protection Agency
ICP-AES – inductively coupled plasma atomic emission spectroscopy
SOP – standard operating procedure

QAPP Worksheet #25: Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference [a]
ICP-AES	ICB/CCB	Instrument Performance	Instrument contamination check	After every calibration verification	ICB:No analytes detected > RL; CCB: no analyte detected > 3X MDL	Determine possible source of contamination and apply appropriate measure to correct the problem. Reanalyze calibration blank and all associated samples.	TestAmerica – St. Louis Analyst	ST-MT-0003
Cold Vapor AA	ICB/CCB	Instrument Performance	Instrument contamination check	After every calibration verification	No analytes detected > RL	Determine possible source of contamination and apply appropriate measure to correct the problem. Reanalyze calibration blank and all associated samples.	TestAmerica – St. Louis Analyst	ST-MT-0005 ST-MT-0007
Gas Flow Proportional Counter	1. Clean instrument 2. Inspect windows 3. QA check	1. Physical check 2. Physical check 3. Background and source count	1. Physical check 2. Physical check 3. Check deviation	1. Daily 2. High counts and/or background 3. Daily	1. None applicable 2. No physical defects 3. Within 3 sigma of 20 day population	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader / Analyst	ST-RD-0403
Gamma Spectrometer	1. Clean cave; fill dewar with N_2 2. QA check	1. Physical check 2. Background and source check	1. Physical check 2. Check deviation	1. Weekly 2. Daily	1. Acceptable background 2. Within 3 sigma of measured population	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader / Analyst	ST-RD-0102

Instrument Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference [a]
Alpha Spectrometer	Clean planchette holders	Physical check	Physical check	Monthly	Acceptable background and calibration efficiencies	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader / Analyst	ST-RC-0210

[1] Specify the appropriate letter or number form the Analytical SOP References table (Worksheet #23)

QAPP Worksheet #26: Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Region 2 SAT Site Project Manager and Field Team, Weston Solutions, Inc., Region 2
Sample Packaging (Personnel/Organization): Region 2 SAT Site Project Manager and sampling team members, Weston Solutions, Inc., Region 2
Coordination of Shipment (Personnel/Organization): Region 2 SAT Site Project Manager, sampling team members, Weston Solutions, Inc., Region 2
Type of Shipment/Carrier: FedEx and/or hand-delivery
SAMPLE RECEIPT AND ANALYSIS
− **Sample Receipt (Personnel/Organization):** TestAmerica Laboratories, Sample Control Supervisor and Project Manager
− **Sample Custody and Storage (Personnel/Organization):** TestAmerica Laboratories, Sample Control Supervisor
− **Sample Preparation (Personnel/Organization):** TestAmerica Laboratories, Radiochemistry Prep Supervisor and Metals Supervisor
− **Sample Determinative Analysis (Personnel/Organization):** TestAmerica Laboratories, Radiochemistry Count Room Supervisor and Metals Supervisor
− **SAMPLE ARCHIVING**
− **Field Sample Storage (No. of days from sample collection):** Samples to be shipped same day or next day of collection, and arrive at laboratory within 24 hours (1 day) of sample shipment
− **Sample Extract/Digestate Storage (No. of days from extraction/digestion):** As per analytical

methodology; see Worksheet #19
− **SAMPLE DISPOSAL**
− **Personnel/Organization:** TestAmerica Laboratories, Sample Control Supervisor
− **Number of Days from Analysis:** Until analysis and QA/QC checks are completed; as per analytical methodology; see Worksheet #19.

QAPP Worksheet #27: Sample Custody Requirements

Sample Identification Procedures: Each sample collected by Region 2 SAT will be designated by a code that will identify the site. The code will be a site-specific task number. The media type will follow the numeric code. A hyphen will separate the site code and media type. Specific media types are as follows: SG – Slag; S – Soil Sample; RIN – Rinsate Blank After the media type, the sequential sample numbers will be listed; duplicate samples will be identified in the same manner as other samples and will be distinguished and documented in the field logbook. e.g. 2223-SG01 Site ID (2223), Slag Sample Number (SG01) 2223-S01 Site ID (2223), Soil Sample Number (S01) 2223-RIN01 Site ID (2223), Rinsate Blank Sample Number (RIN01).
Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory): Each sample will be individually identified and labeled after collection, then sealed with custody seals and enclosed in a plastic cooler. The sample information will be recorded on chain-of custody (COC) forms, and will be either hand delivered or shipped to the appropriate laboratory via overnight delivery service or courier. COC records must be prepared in Scribe to accompany samples from the time of collection and throughout the shipping process. Each individual in possession of the samples must sign and date the sample COC Record. The chain-of-custody record will be considered completed upon receipt at the laboratory. A traffic report and chain-of-custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. Specific information regarding custody of the samples projected to be collected on the weekend will be noted in the field logbook. The chain-of-custody record should include (at minimum) the following: 1) Sample identification number; 2) Sample information; 3) Sample location; 4) Sample date; 5) Sample Time; 6) Sample Type Matrix; 7) Sample Container Type; 8) Sample Analysis Requested; 9) Name(s) and signature(s) of sampler(s); and 10) Signature(s) of any individual(s) with custody of samples. **For this event each parcel will have its own chain-of custody**. A separate COC form must accompany each cooler for each daily shipment The chain-of-custody form must address all samples in that cooler, but not address samples in any other cooler. This practice maintains the chain-of-custody for all samples in case of mis-shipment.
Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal): A sample custodian at the laboratory will accept custody of the shipped samples, and check them for discrepancies, proper preservation, integrity, etc. If noted, issues will be forwarded to the laboratory manager for corrective action. The sample custodian will relinquish custody to the appropriate department for analysis. At this time, no samples will be archived at the laboratory. Disposal of the samples will occur only after analyses and QA/QC checks are completed.

QAPP Worksheet #28: QC Samples Table

(UFP-QAPP Manual Section 3.4)

Complete a separate worksheet for each sampling technique, analytical method/SOP, matrix, analytical group, and concentration level. If method/SOP QC acceptance limit exceed the measurement performance criteria, the data obtained may be unusable for making project decisions.

Matrix	Soil / Aqueous[1]
Analytical Group	TAL Metals
Concentration Level	Low/Medium
Sampling SOP	2012
Analytical Method/ SOP Reference	SW846 6010C ST-MT-0003
Sampler's Name	Denise Breen, Jeffrey Lynes, Sam Cheek
Field Sampling Organization	Weston Solutions, Inc. START Region 5
Analytical Organization	TestAmerica Laboratories, Inc.
No. of Sample Locations	16

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Initial Calibration Verification	Immediately following each calibration ,after every 10 samples and at the end of each analytical run	90%-110%	Check Instrument, Reanalyze	Lab personnel	Accuracy	90%-110%
Continuing Calibration Verification (Alternate check standard)	Every 10 samples and at the end of each analytical run	90%-110%	Reanalyze, Qualify data	Lab personnel	Accuracy	90%-110%
Initial Calibration Blank(ICB)	After ICV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Continuing Calibration Blank(CCB)	After every CCV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Low Level Check Standard	At Beginning and end of each analytical run	± 30% of the true value	Check Instrument, Re-calibrate	Lab personnel	Accuracy	± 30% of the true value
Interference Check Sample	At Beginning and end of each analytical run	< RL Except Al ,Fe, Ca, K, Mg and Na	Per method SW846 6010C	Lab personnel	Precision	< RL Except Al ,Fe, Ca, K, Mg and Na

Method blank	1 per extraction batch of ≤ 20 samples	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
LCS	1 per extraction batch of ≤ 20 samples	Limits: Average Recovery ± 20% aqueous, SRM Limits Soil) % RPD < 20(Aq), % RPD <20(Soil)	Qualify data	Lab personnel	Accuracy/ Precision	Limits: Average Recovery ± 20% aqueous, SRM Limits Solids) % RPD < 20(Aq), % RPD <20(Soil
Laboratory Matrix spikes	1 per extraction batch of ≤ 20 samples	Limits ± 25% aqueous, ± 25% Soil) % RPD < 20(Aq), % RPD <30(Soil)	Qualify data	Lab personnel	Accuracy	Limits ± 25% aqueous, ± 25% Soil) % RPD < 20(Aq), % RPD <30(Soil)
Serial Dilution Test (ICP-200.7)	Matrix spike sample	RPD < 10 %	Qualify data	Lab personnel	Precision	RPD < 10 %

[1] Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #28: QC Samples Table (continued)

Matrix	Soil / Aqueous[1]
Analytical Group	TAL Metals
Concentration Level	Low/Medium
Sampling SOP	2012
Analytical Method/ SOP Reference	SW846 7470A/7471B ST-MT-0005/ST-MT-0007
Sampler's Name	Denise Breen, Jeffrey Lynes, Sam Cheek
Field Sampling Organization	Weston Solutions, Inc. START Region 5
Analytical Organization	TestAmerica Laboratories, Inc.
No. of Sample Locations	16

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Initial Calibration Verification	Immediately following each calibration ,after every 10 samples and at the end of each analytical run	90%-110%	Check Instrument, Reanalyze	Lab personnel	Accuracy	90%-110%
Continuing Calibration Verification (Alternate check standard)	Every 10 samples and at the end of each analytical run	80%-120%	Reanalyze, Qualify data	Lab personnel	Accuracy	90%-110%
Initial Calibration Blank(ICB)	After ICV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Continuing Calibration Blank(CCB)	After every CCV	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL
Low Level Check Standard	At Beginning and end of each analytical run	± 30% of the true value	Check Instrument, Re-calibrate	Lab personnel	Accuracy	± 30% of the true value
Method blank	1 per extraction batch of ≤ 20 samples	< RL	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< RL

LCS	1 per extraction batch of ≤ 20 samples	Limits: Average Recovery 80-120% aqueous, 51-148% Soil) % RPD < 20(Aq), % RPD <20(Soil)	Qualify data	Lab personnel	Accuracy/ Precision	Limits: Average Recovery 80-120% aqueous, 51-148% Soil) % RPD < 20(Aq), % RPD <20(Soil)
Laboratory Matrix spikes	1 per extraction batch of ≤ 20 samples	Limits 80-120% aqueous, 80-120 Soil) % RPD < 20(Aq), % RPD <30(Soil)	Qualify data	Lab personnel	Accuracy	Limits 80-120% aqueous, 80-120 Soil) % RPD < 20(Aq), % RPD <30(Soil)
Serial Dilution Test	Matrix spike sample	RPD < 10 %	Qualify data	Lab personnel	Precision	RPD < 10 %

[1] Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #28: QC Samples Table (continued)

Matrix	Slag/Soil
Analytical Group	Gamma Spec.
Concentration Level	Low/Medium
Sampling SOP	2012
Analytical Method/ SOP Reference	HASL 300 ST-RD-0102
Sampler's Name	Denise Breen, Jeffrey Lynes, Sam Cheek
Field Sampling Organization	Weston Solutions, Inc. START Region 5
Analytical Organization	TestAmerica Laboratories, Inc.
No. of Sample Locations	19

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	1 per extraction batch of ≤ 20 samples	< MDC	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< MDC
LCS	1 per extraction batch of ≤ 20 samples	Limits: 87-116% Am-241 87-120% Cs-137 87-115% Co-60	Qualify data	Lab personnel	Accuracy/ Precision	Limits: 87-116% Am-241 87-120% Cs-137 87-115% Co-60
Sample Duplicate	1 per extraction batch of ≤ 20 samples	Limits <40% RPD or <1% RER	Qualify data	Lab personnel	Precision	Limits <40% RPD or <1% RER

QAPP Worksheet #28: QC Samples Table (continued)

Matrix	Aqueous[1]
Analytical Group	Gamma Spec.
Concentration Level	Low/Medium
Sampling SOP	2012
Analytical Method/ SOP Reference	HASL 300 ST-RD-0102
Sampler's Name	Denise Breen, Jeffrey Lynes, Sam Cheek
Field Sampling Organization	Weston Solutions, Inc. START Region 5
Analytical Organization	TestAmerica Laboratories, Inc.
No. of Sample Locations	2

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	1 per extraction batch of ≤ 20 samples	< MDC	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< MDC
LCS	1 per extraction batch of ≤ 20 samples	Limits: 90-111% Am-241 90-111% Cs-137 89-110% Co-60	Qualify data	Lab personnel	Accuracy/ Precision	Limits: 90-111% Am-241 90-111% Cs-137 89-110% Co-60
Sample Duplicate	1 per extraction batch of ≤ 20 samples	Limits <40% RPD or <1% RER	Qualify data	Lab personnel	Precision	Limits <40% RPD or <1% RER

[1] Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #28: QC Samples Table (continued)

Matrix	Slag/Soil
Analytical Group	Alpha Spec.
Concentration Level	Low/Medium
Sampling SOP	2012
Analytical Method/ SOP Reference	HASL 300 ST-RD-0210
Sampler's Name	Denise Breen, Jeffrey Lynes, Sam Cheek
Field Sampling Organization	Weston Solutions, Inc. START Region 5
Analytical Organization	TestAmerica Laboratories, Inc.
No. of Sample Locations	19

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	1 per extraction batch of ≤ 20 samples	< MDC	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< MDC
LCS	1 per extraction batch of ≤ 20 samples	Limits: 70-130% Th-228 81-118% Th-230 70-130% Th-232 84-120% U-234 82-122% U-238	Qualify data	Lab personnel	Accuracy/ Precision	Limits: 70-130% Th-228 81-118% Th-230 70-130% Th-232 84-120% U-234 82-122% U-238
Sample Duplicate	1 per extraction batch of ≤ 20 samples	Limits <40% RPD or <1% RER	Qualify data	Lab personnel	Precision	Limits <40% RPD or <1% RER
Tracer (Th-229/U-232)	Every field and batch QC samples	Limits: 30-110%	Qualify data	Lab personnel	Accuracy	Limits: 30-110%

QAPP Worksheet #28: QC Samples Table (continued)

Matrix	Aqueous[1]
Analytical Group	Alpha Spec.
Concentration Level	Low/Medium
Sampling SOP	2012
Analytical Method/ SOP Reference	HASL 300 ST-RD-0210
Sampler's Name	Denise Breen, Jeffrey Lynes, Sam Cheek
Field Sampling Organization	Weston Solutions, Inc. START Region 5
Analytical Organization	TestAmerica Laboratories, Inc.
No. of Sample Locations	2

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	1 per extraction batch of ≤ 20 samples	< MDC	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< MDC
LCS	1 per extraction batch of ≤ 20 samples	Limits: 70-130% Th-228 81-125% Th-230 70-130% Th-232 84-120% U-234 83-121% U-238	Qualify data	Lab personnel	Accuracy/ Precision	Limits: 70-130% Th-228 81-125% Th-230 70-130% Th-232 84-120% U-234 83-121% U-238
Sample Duplicate	1 per extraction batch of ≤ 20 samples	Limits <40% RPD or <1% RER	Qualify data	Lab personnel	Precision	Limits <40% RPD or <1% RER
Tracer (Th-229/U-232)	Every field and batch QC samples	Limits: 30-110%	Qualify data	Lab personnel	Accuracy	Limits: 30-110%

[1] Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #28: QC Samples Table (continued)

Matrix	Aqueous
Analytical Group	Ra-226/228
Concentration Level	Low/Medium
Sampling SOP	2012
Analytical Method/ SOP Reference	SW846 9315/9320 ST-RD-0403
Sampler's Name	Denise Breen, Jeffrey Lynes, Sam Cheek
Field Sampling Organization	Weston Solutions, Inc. START Region 5
Analytical Organization	TestAmerica Laboratories, Inc.
No. of Sample Locations	2

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method blank	1 per extraction batch of ≤ 20 samples	< MDC	Investigate source of contamination	Lab personnel	Sensitivity Contamination	< MDC
LCS	1 per extraction batch of ≤ 20 samples	Limits: 68-137% Ra-226 56-140% Ra-228	Qualify data	Lab personnel	Accuracy/ Precision	Limits: 68-137% Ra-226 56-140% Ra-228
Sample Duplicate	1 per extraction batch of ≤ 20 samples	Limits <40% RPD or <1% RER	Qualify data	Lab personnel	Precision	Limits <40% RPD or <1% RER
Ba/Y Carrier	Every field and batch QC samples	Limits: 40-110%	Qualify data	Lab personnel	Accuracy	Limits: 40-110%

[1] Aqueous samples will consist of rinsate blank samples only. Aqueous field duplicate and MS/MSD samples will not be collected.

QAPP Worksheet #29: Project Documents and Records Table

Sample Collection Documents and Records	Analysis Documents and Records	Data Assessment Documents and Records	Other
• Field logbooks • COC forms • Field Data Sheets • Photo-document	• Sample receipt logs • Internal and external COC forms • Equipment calibration logs • Sample preparation worksheets/logs • Sample analysis worksheets/run logs • Telephone/email logs • Corrective action documentation	• Data validation reports • Field inspection checklist(s) • Review forms for electronic entry of data into database • Corrective action documentation	

QAPP Worksheet #30: Analytical Services Table

Matrix	Analytical Group	Concentration Level	Analytical SOP	Data Package Turnaround Time	Laboratory/Organization (Name and Address, Contact Person and Telephone Number)	Backup Laboratory/Organization (Name and Address, Contact Person and Telephone Number)
Soil	TAL Metals	Low/Medium	See Worksheet #23	21 days preliminary	TestAmerica Laboratories, Inc. 13715 Rider Trial North St. Louis, MO 63045 Erika Gish 314-298-8566	NA
Slag/Soil	Radiochemistry	Low/Medium	See Worksheet #23	30 days preliminary	TestAmerica Laboratories, Inc. 13715 Rider Trial North St. Louis, MO 63045 Erika Gish 314-298-8566	NA

NA – not applicable
SOP – standard operating procedure
TAL – target analyte list

QAPP Worksheet #31: Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (Title and Organizational Affiliation)	Person(s) Responsible for Responding to Assessment Findings (Title and Organizational Affiliation)	Person(s) Responsible for Identifying and Implementing Corrective Actions (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
TestAmerica Laboratories, Inc.							
Proficiency Testing	Semiannually	External	NELAC	PT provider	Lab Personnel	Lab Personnel	Lab QA Officer
NELAC	Every two years	External	NELAC	NELAC Representative	Lab QA Officer	Lab Personnel	NELAC Representative
Internal Audit	Annually	Internally	TestAmerica Laboratories, Inc.	Lab QA Officer	Lab Personnel	Lab Personnel	Lab QA Officer

QAPP Worksheet #32: Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Project Readiness Review	Checklist or logbook entry	START Region 5 Site Project Manager, Weston Solutions, Inc.	Immediately to within 24 hours of review	Checklist or logbook entry	START Region 5 Site Project Leader	Immediately to within 24 hours of review
Field Observations/ Deviations from Work Plan	logbook	START Region 5 Site Project Manager, Weston Solutions, Inc. and EPA WAM	Immediately to within 24 hours of deviation	logbook	START Region 5 Site Project Manager and EPA WAM	Immediately to within 24 hours of deviation
Proficiency Testing	letter with PT failure indicated	Lab QA Officer	30 days after the audit	Investigate the reason for the PT failure	Lab QA Officer	25 days after the CA report
NELAC	Audit Report with Non-conformance to QAPP, SOPs, NELAC+LQMP	Lab Management	30 days after the audit	Investigate and have a corrective action plan for the deficiencies	NELAC Representative	30 days after receiving notification

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Timeframe for Response
Internal	Audit Report with Non-conformance to QAPP, SOPs, NELAC Regulations	Lab Management	30 days after the audit	Investigate and have a corrective action plan for the deficiencies	Lab QA Officer	45 days after the CA report

QAPP Worksheet #33: QA Management Reports Table

Type of Report	Frequency (Daily, weekly, monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
TestAmerica Laboratories, Inc.				
TestAmerica Laboratories, Inc. (preliminary)	As performed	2 weeks from the sampling date	TestAmerica Laboratories, Inc.	WESTON Data Validator and START Region 5 SPM, Weston Solutions, Inc.
TestAmerica Laboratories, Inc. (validated)	As performed	21 days after receipt of preliminary data	WESTON Data Validator	START Region 5 SPM, Weston Solutions, Inc., and WAM/Task Monitor, EPA Region 2
On-Site Field Inspection	As performed	7 calendar days after completion of the inspection	START Region 5, TO13 (Region 2 SAT) HSO	START Region 5 SPM, Weston Solutions, Inc.
Final Report	As performed	Within 60 days after receipt of EPA approval of data package	START Region 5 SPM	EPA WAM/Task Monitor

QAPP Worksheet #34: Verification (Step I) Process Table

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Site/field logbooks	Field notes will be prepared daily by the START Region 5 Site Project Manager and will be complete, appropriate, legible and pertinent. Upon completion of field work, logbooks will be placed in the project files.	I	START Region 5 Site Project Manager
Chains of custody	COC forms will be reviewed against the samples packed in the specific cooler prior to shipment. The reviewer will initial the form. An original COC will be sent with the samples to the laboratory, while copies are retained for (1) the Sampling Trip Report and (2) the project files.	I	START Region 5 Site Project Manager
Sampling Trip Reports	STRs will be prepared for each week of field sampling. Information in the STR will be reviewed against the COC forms, and potential discrepancies will be discussed with field personnel to verify locations, dates, etc.	I	START Region 5 Site Project Manager
Laboratory analytical data package	Data packages will be reviewed/verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	E	TestAmerica Laboratories, Inc.
Laboratory analytical data package	Data packages will be reviewed as to content and sample information upon receipt by WESTON.	I	WESTON Data Validation Personnel
Final PA/SI Report	The PA/ SI can be used to determine if on-site waste sources are present and if nearby targets are exposed to site-related contamination.	I	START Region 5 Site Project Manager
TestAmerica Laboratories, Inc.			
Chain of Custody	Chain-of-custody forms will be verified against the sample cooler they represent. Sample Receipt Checklist is completed. The TestAmerica Project Manager utilizes the analyses request information and the external COC to review the accuracy and completeness of LIMS log-in entries, as reflected on the LIMS Sample Receipt Acknowledgement. Details can be found in Laboratory Quality Assurance Manual and/or SOP	I	Sample Control Technician or Sample Control Supervisor and Project Manager TestAmerica Laboratories, Inc.

QAPP Worksheet #34: Verification (Step I) Process Table (Concluded)

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Analytical data package/ Final Report	The procedures for data review : 1- Data reduction/review by Primary Analyst. 2- Review complete data package (raw data) by 2nd Level Peer Reviewer 3- The TestAmerica Project Manager reviews the deliverables (level II, level IV, and EDD for completeness and general compliance with the objectives of the project. This final review typically does not include a review of raw data. Details can be found in Laboratory Quality Assurance Manual and/or SOP.	I	Primary Analyst, Department Supervisor, Project Manager. TestAmerica Laboratories, Inc.

QAPP Worksheet #35: Validation (Steps IIa and IIb) Process Table

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	SOPs	Ensure that the sampling methods/procedures outlined in QAPP were followed, and that any deviations were noted/approved.	START Region 5 Site Project Manager
IIb	SOPs	Determine potential impacts from noted/approved deviations, in regard to PQOs.	START Region 5 Site Project Manager
TestAmerica Laboratory			
	Chain of Custody	Chain-of-custody forms will be verified against the sample cooler they represent. Sample Receipt Checklist is completed. The TestAmerica Project Manager utilizes the analyses request information and the external COC to review the accuracy and completeness of LIMS log-in entries, as reflected on the LIMS Sample Receipt Acknowledgement. Details can be found in Laboratory Quality Assurance Manual and/or SOP	Sample Control Technician or Sample Control Supervisor and Project Manager TestAmerica Laboratories, Inc.
	Analytical data package/ Final Report	The procedures for data review : 1- Data reduction/review by Primary Analyst. 2- Review complete data package (raw data) by 2nd Level Peer Reviewer 3- The TestAmerica Project Manager reviews the deliverables (level II, level IV, and EDD for completeness and general compliance with the objectives of the project. This final review typically does not include a review of raw data. Details can be found in Laboratory Quality Assurance Manual and/or SOP.	Primary Analyst, Department Supervisor, Project Manager. TestAmerica Laboratories, Inc.

QAPP Worksheet #35: Validation (Steps IIa and IIb) Process Table (Concluded)

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
IIa	Chains of custody	Examine COC forms against QAPP and laboratory contract requirements (e.g., analytical methods, sample identification, etc.).	Weston Solutions, Inc. Data Validation Personnel and Certified Health Physicist
IIa	Laboratory data package	Examine packages against QAPP and laboratory contract requirements, and against COC forms (e.g., holding times, sample handling, analytical methods, sample identification, data qualifiers, QC samples, etc.).	Weston Solutions, Inc. Data Validation Personnel and Certified Health Physicist
IIb	Laboratory data package	Determine potential impacts from noted/approved deviations, in regard to PQOs. Examples include PQLs and QC sample limits (precision/accuracy).	Weston Solutions, Inc. Data Validation Personnel and Certified Health Physicist
IIb	Field duplicates	Compare results of field duplicate (or replicate) analyses with RPD criteria	Weston Solutions, Inc. Data Validation Personnel and Certified Health Physicist

QAPP Worksheet #36: Validation (Steps IIa and IIb) Summary Table

Step IIa/IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational affiliation)
IIa / IIb	Soil	TAL Metals & Mercury	Low	Data Validation SOP for Analysis of Low/Medium Concentration for Total Metals & Mercury	Weston Solutions, Inc. Data Validation Personnel

QAPP Worksheet #37: Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: Data, whether generated in the field or by the laboratory, are tabulated and reviewed for Precision, Accuracy, Representativeness, Completeness, and Comparability (PARCCS) by the SPM for field data or the data validator for laboratory data. The review of the PARCC DQIs will compare with the DQO detailed in the site-specific QAPP, the analytical methods used and impact of any qualitative and quantitative trends will be examined to determine if bias exists. A hard copy of field data is maintained in a designated field or site logbook. Laboratory data packages are validated, and final data reports are generated. All documents and logbooks are assigned unique and specific control numbers to allow tracking and management.
Questions about Non-CLP data, as observed during the data review process, are resolved by contacting the respective site personnel and laboratories as appropriate for resolution. All communications are documented in the data validation record with comments as to the resolution to the observed deficiencies.

Where applicable, the following documents will be followed to evaluate data for fitness in decision making: EPA QA/G-4, *Guidance on Systematic Planning using the Data Quality Objectives Process*, EPA/240/B-06/001, February 2006, and EPA QA/G-9R, *Guidance for Data Quality Assessment*, A reviewer's Guide EPA/240/B-06/002, February 2006.

Describe the evaluative procedures used to assess overall measurement error associated with the project:
As delineated in the *Uniform Federal Policy for Implementing Environmental Quality Systems: Evaluating, Assessing and Documenting Environmental Data Collection and Use Programs Part 1: UFP-QAPP (EPA-505-B-04-900A, March 2005); Part 2A: UFP-QAPP Workbook (EPA-505-B-04-900C, March 2005); Part 2B: Quality Assurance/Quality Control Compendium: Non-Time Critical QA/QC Activities (EPA-505-B-04-900B, March 2005);* "Graded Approach" will be implemented for data collection activities that are either exploratory or small in nature or where specific decisions cannot be identified, since this guidance indicates that the formal DQO process is not necessary.

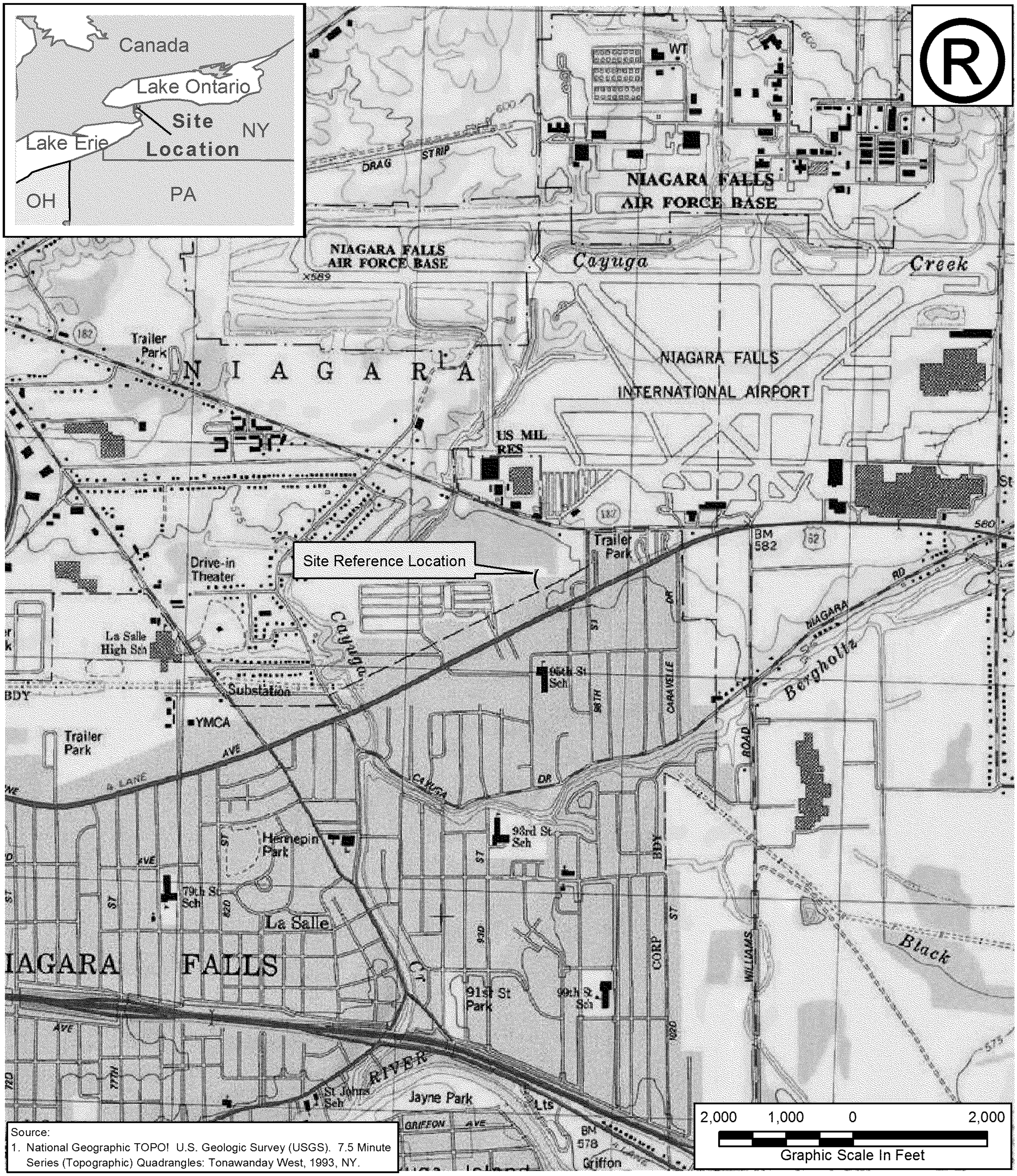
The data will be evaluated to determine whether they satisfy the PQO for the project. The validation process determines if the data satisfy the QA criteria. After the data pass the data validation process, comparison results with the PQO is done.

QAPP Worksheet #37: Usability Assessment (Concluded)

Analytical data will be compared with EPA Generic Soil Screening Levels for ingestion. EPA will use the analytical data from this investigation to determine if slag and soil at the site contains elevated concentrations of TAL metals and radionuclides. **Identify the personnel responsible for performing the usability assessment:** SPM, Data Validation Personnel, and EPA Region 2 WAM **Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:** A copy of the most current approved QAPP, including any graphs, maps and text reports developed will be provided to all personnel identified on the distribution list.

ATTACHMENT A

Figure 1 - Site Location Map
Figure 2 – Site Map
Figure 3 – Gamma Radiation Screening Results Map
Figure 4 - Proposed Soil Sample Location Map



Source:
1. National Geographic TOPO! U.S. Geologic Survey (USGS). 7.5 Minute Series (Topographic) Quadrangles: Tonawanday West, 1993, NY.

LEGEND:

(Site Reference Location

TITLE:

Site Location Map
Niagara Falls Boulevard
Niagara Falls, NY

PROJECT:
Niagara Falls Boulevard

CLIENT NAME:
EPA

DATE:
November 2013

FIGURE #:
1

P:\SAT2\2013NY RAD Sites\Niagara_Falls_Boulevard\MXD\13815_NFB_Topo.mxd

P:/SAT2/2013 NY RAD Sites/Niagara_Falls_Boulevard/MXD/13800_NFB_Aerial.mxd

SOURES:
1. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Niagara County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.
2. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Erie County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.

Scale: 50 25 0 50 Graphic Scale In Feet	TITLE: Site Map Niagara Falls Boulevard Niagara Falls, NY	DRAWN BY: J. Lynes REVIEWEDBY: D. Breen PROJECT MANAGER: N. Shannon SCALE: 1" = 50'	®
PROJECT: Niagara Falls Boulevard			
CLIENT NAME: EPA	WESTON SOLUTIONS · DRAWINGNUMBER: 13800 · FIGURE #: 2	DATE: November 2013	

P:/SAT2/2013 NY RAD Sites/Niagara_Falls_Boulevard/MXD/13614_NFB_Recon

Scale: 50 25 0 50 Graphic Scale In Feet	TITLE: Gamma Radiation Screening Results Map Niagara Falls Boulevard Niagara Falls, NY
PROJECT: Niagara Falls Boulevard	
CLIENT NAME: EPA	WESTON SOLUTIONS
DRAWING NUMBER: 13614	FIGURE #: 3
DRAWN BY: J. Lynes	REVIEWED BY: N. Shannon
PROJECT MANAGER: N. Shannon	SCALE: 1" = 50'
DATE: September 2013	

P:/SAT2/2013 NY RAD Sites/Niagara_Falls_Boulevard/MXD/13614_NFB_Recon

Legend

Proposed Sample Location

NOTES:
1. Sample IDs preceded by "2223-".
2. Three slag samples will be collected at locations determined during sampling.

SOURES:
1. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Niagara County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.
2. NYS Division of Homeland Security and Emergency Services - Office of Cyber Security. Erie County 12 Inch Ortho (4bd). http://www.orthos.dhses.ny.gov/?id=974130. November 2011.

Scale: 80 40 0 80 Graphic Scale In Feet	TITLE: Proposed Sample Location Map Niagara Falls Boulevard Niagara Falls, NY	DRAWN BY: J. Lynes	
		REVIEWED BY: N. Shannon	
PROJECT: Niagara Falls Boulevard		PROJECT MANAGER: N. Shannon	
		SCALE: 1" = 80'	
CLIENT NAME: EPA	WESTON SOLUTIONS | DRAWING NUMBER: 13788 | FIGURE #: 4	DATE: November 2013	

ATTACHMENT B

Sampling SOPs

EPA/ERT SOP # 2001
EPA/ERT SOP # 2012

GENERAL FIELD SAMPLING GUIDELINES

SOP#: 2001
DATE: 08/11/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this Standard Operating Procedure (SOP) is to provide general field sampling guidelines that will assist REAC personnel in choosing sampling strategies, location, and frequency for proper assessment of site characteristics. This SOP is applicable to all field activities that involve sampling.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent on site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Sampling is the selection of a representative portion of a larger population, universe, or body. Through examination of a sample, the characteristics of the larger body from which the sample was drawn can be inferred. In this manner, sampling can be a valuable tool for determining the presence, type, and extent of contamination by hazardous substances in the environment.

The primary objective of all sampling activities is to characterize a hazardous waste site accurately so that its impact on human health and the environment can be properly evaluated. It is only through sampling and analysis that site hazards can be measured and the job of cleanup and restoration can be accomplished effectively with minimal risk. The sampling itself must be conducted so that every sample collected retains its original physical form and chemical composition. In this way, sample integrity is insured, quality assurance standards are maintained, and the sample can accurately represent the larger body of material under investigation.

The extent to which valid inferences can be drawn from a sample depends on the degree to which the sampling effort conforms to the project's objectives. For example, as few as one sample may produce adequate, technically valid data to address the project's objectives. Meeting the project's objectives requires thorough planning of sampling activities, and implementation of the most appropriate sampling and analytical procedures. These issues will be discussed in this procedure.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

The amount of sample to be collected, and the proper sample container type (i.e., glass, plastic), chemical preservation, and storage requirements are dependent on the matrix being sampled and the parameter(s) of interest. Sample preservation, containers, handling, and storage for air and waste samples are discussed in the specific SOPs for air and waste sampling techniques.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The nature of the object or materials being sampled may be a potential problem to the sampler. If a material is homogeneous, it will generally have a uniform composition throughout. In this case, any sample increment can be considered representative of the material. On the other hand, heterogeneous samples present problems to the sampler because of changes in the material over distance, both laterally and vertically.

Samples of hazardous materials may pose a safety threat to both field and laboratory personnel. Proper health and safety precautions should be implemented when handling this type of sample.

Environmental conditions, weather conditions, or non-target chemicals may cause problems and/or interferences when performing sampling activities or when sampling for a specific parameter. Refer to the specific SOPs for sampling techniques.

5.0 EQUIPMENT/APPARATUS

The equipment/apparatus required to collect samples must be determined on a site specific basis. Due to the wide variety of sampling equipment available, refer to the specific SOPs for sampling techniques which include lists of the equipment/apparatus required for sampling.

6.0 REAGENTS

Reagents may be utilized for preservation of samples and for decontamination of sampling equipment. The preservatives required are specified by the analysis to be performed. Decontamination solutions are specified in ERT SOP #2006, Sampling Equipment Decontamination.

7.0 PROCEDURE

7.1 Types of Samples

In relation to the media to be sampled, two basic types of samples can be considered: the environmental sample and the hazardous sample.

Environmental samples are those collected from streams, ponds, lakes, wells, and are off-site samples that are not expected to be contaminated with hazardous materials. They usually do not require the special handling procedures typically used for concentrated wastes. However, in certain instances, environmental samples can contain elevated concentrations of pollutants and in such cases would have to be handled as hazardous samples.

Hazardous or concentrated samples are those collected from drums, tanks, lagoons, pits, waste piles, fresh spills, or areas previously identified as contaminated, and require special handling procedures because of their potential toxicity or hazard. These samples can be further subdivided based on their degree of hazard; however, care should be taken when handling and shipping any wastes believed to be concentrated regardless of the degree.

The importance of making the distinction between environmental and hazardous samples is two-fold:

(1) Personnel safety requirements: Any sample thought to contain enough hazardous materials to pose a safety threat should be designated as hazardous and handled in a manner which ensures the safety of both field and laboratory personnel.

(2) Transportation requirements: Hazardous samples must be packaged, labeled, and shipped according to the International Air Transport Association (IATA) Dangerous Goods Regulations or Department of Transportation (DOT) regulations and U.S. EPA guidelines.

7.2 Sample Collection Techniques

In general, two basic types of sample collection techniques are recognized, both of which can be used for either environmental or hazardous samples.

Grab Samples

A grab sample is defined as a discrete aliquot representative of a specific location at a given point in time. The sample is collected all at once at one particular point in the sample medium. The representativeness of such samples is defined by the nature of the materials being sampled. In general, as sources vary over time and distance, the representativeness of grab samples will decrease.

Composite Samples

Composites are nondiscrete samples composed of more than one specific aliquot collected at various sampling locations and/or different points in time. Analysis of this type of sample produces an average value and can in certain instances be used as an alternative to analyzing a number of individual grab samples and calculating an average value. It should be noted, however, that compositing can mask problems by diluting isolated concentrations of some hazardous compounds below detection limits.

Compositing is often used for environmental samples and may be used for hazardous samples under certain conditions. For example, compositing of hazardous waste is often performed after compatibility tests have been completed to determine an average value over a number of different locations (group of drums). This procedure generates data that can be useful by providing an average concentration within a number of units, can serve to keep analytical costs down, and can provide information useful to transporters and waste disposal operations.

For sampling situations involving hazardous wastes, grab sampling techniques are generally preferred because grab sampling minimizes the amount of time sampling personnel must be in contact with the wastes, reduces risks associated with compositing unknowns, and eliminates chemical changes that might occur due to compositing.

7.3 Types of Sampling Strategies

The number of samples that should be collected and analyzed depends on the objective of the investigation. There are three basic sampling strategies: random, systematic, and judgmental sampling.

Random sampling involves collection of samples in a nonsystematic fashion from the entire site or a specific portion of a site. Systematic sampling involves collection of samples based on a grid or a pattern which has been previously established. When judgmental sampling is performed, samples are collected only from the portion(s) of the site most likely to be contaminated. Often, a combination of these strategies is the best approach depending on the type of the suspected/known contamination, the uniformity and size of the site, the level/type of information desired, etc.

7.4 QA Work Plans (QAWP)

A QAWP is required when it becomes evident that a field investigation is necessary. It should be initiated in conjunction with, or immediately following, notification of the field investigation. This plan should be clear and concise and should detail the following basic components, with regard to sampling activities:

C Objective and purpose of the investigation.
C Basis upon which data will be evaluated.
C Information known about the site including location, type and size of the facility, and length of operations/abandonment.
C Type and volume of contaminated material, contaminants of concern (including concentration), and basis of the information/data.
C Technical approach including media/matrix to be sampled, sampling equipment to be used, sample equipment decontamination (if necessary), sampling design and rationale, and SOPs or description of the procedure to be implemented.
C Project management and reporting, schedule, project organization and responsibilities, manpower and cost projections, and required deliverables.
C QA objectives and protocols including tables summarizing field sampling and QA/QC analysis and objectives.

Note that this list of QAWP components is not all-inclusive and that additional elements may be added or altered depending on the specific requirements of the field investigation. It should also be recognized that although a detailed QAWP is quite important, it may be impractical in some instances. Emergency responses and accidental spills are prime examples of such instances where time might prohibit the development of site-specific QAWPs prior to field activities. In such cases, investigators would have to rely on general guidelines and personal judgment, and the sampling or response plans might simply be a strategy based on preliminary information and finalized on site. In any event, a plan of action should be developed, no matter how concise or informal, to aid investigators in maintaining a logical and consistent order to the implementation of their task.

7.5 Legal Implications

The data derived from sampling activities are often introduced as critical evidence during litigation of a hazardous waste site cleanup. Legal issues in which sampling data are important may include cleanup cost recovery, identification of pollution sources and responsible parties, and technical validation of remedial design methodologies. Because of the potential for involvement in legal actions, strict adherence to technical and administrative SOPs is essential during both the development and implementation of sampling activities.

Technically valid sampling begins with thorough planning and continues through the sample collection and analytical procedures. Administrative requirements involve thorough, accurate documentation of all sampling activities. Documentation requirements include maintenance of a chain of custody, as well as accurate records of field activities and analytical instructions. Failure to observe these procedures fully and consistently may result in data that are questionable, invalid and non-defensible in court, and the consequent loss of enforcement proceedings.

8.0 CALCULATIONS

Refer to the specific SOPs for any calculations which are associated with sampling techniques.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Refer to the specific SOPs for the type and frequency of QA/QC samples to be analyzed, the acceptance criteria for the QA/QC samples, and any other QA/QC activities which are associated with sampling techniques.

10.0 DATA VALIDATION

Refer to the specific SOPs for data validation activities that are associated with sampling techniques.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures.

SOIL SAMPLING

SOP#: 2012
DATE: 11/16/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT/APPARATUS

Soil sampling equipment includes the following:

C Sampling plan
C Maps/plot plan
C Safety equipment, as specified in the Health and Safety Plan
C Survey equipment
C Tape measure
C Survey stakes or flags
C Camera and film
C Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
C Appropriate size sample containers
C Ziplock plastic bags
C Logbook
C Labels
C Chain of Custody records and seals
C Field data sheets
C Cooler(s)
C Ice
C Vermiculite
C Decontamination supplies/equipment
C Canvas or plastic sheet
C Spade or shovel

- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in the Sampling Equipment Decontamination SOP and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample.

This method can be used in most soil types but is limited to sampling near surface areas. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. Care should be exercised to avoid use of devices plated with chrome or other materials. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or

other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of three feet.

The following procedure will be used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect the sample after the auger is removed from the boring and proceed to Step 10.

5. Remove auger tip from drill rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube samplerinto soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the

caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable State regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure will be used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

The procedure for split spoon sampling describes the collection and extraction of undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D 1586-67 (reapproved 1974).

The following procedures will be used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler

is typically available in 2 and 3 1/2 inch diameters. However, in order to obtain the required sample volume, use of a larger barrel may be required.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

These relatively large excavations are used to remove sections of soil, when detailed examination of soil characteristics (horizontal, structure, color, etc.) are required. It is the least cost effective sampling method due to the relatively high cost of backhoe operation.

The following procedures will be used for collecting soil samples from test pit/trench excavations:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of utility lines, subsurface pipes and poles (subsurface as well as above surface).

2. Using the backhoe, a trench is dug to approximately three feet in width and approximately one foot below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

3. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

4. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

5. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

6. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures.

12.0 REFERENCES

Mason, B.J., Preparation of Soil Sampling Protocol: Technique and Strategies. 1983 EPA-600/4-83-020.

Barth, D.S. and B.J. Mason, Soil Sampling Quality Assurance User's Guide. 1984 EPA-600/4-84-043.

U.S. EPA. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. 1984 EPA-600/4-84-076.

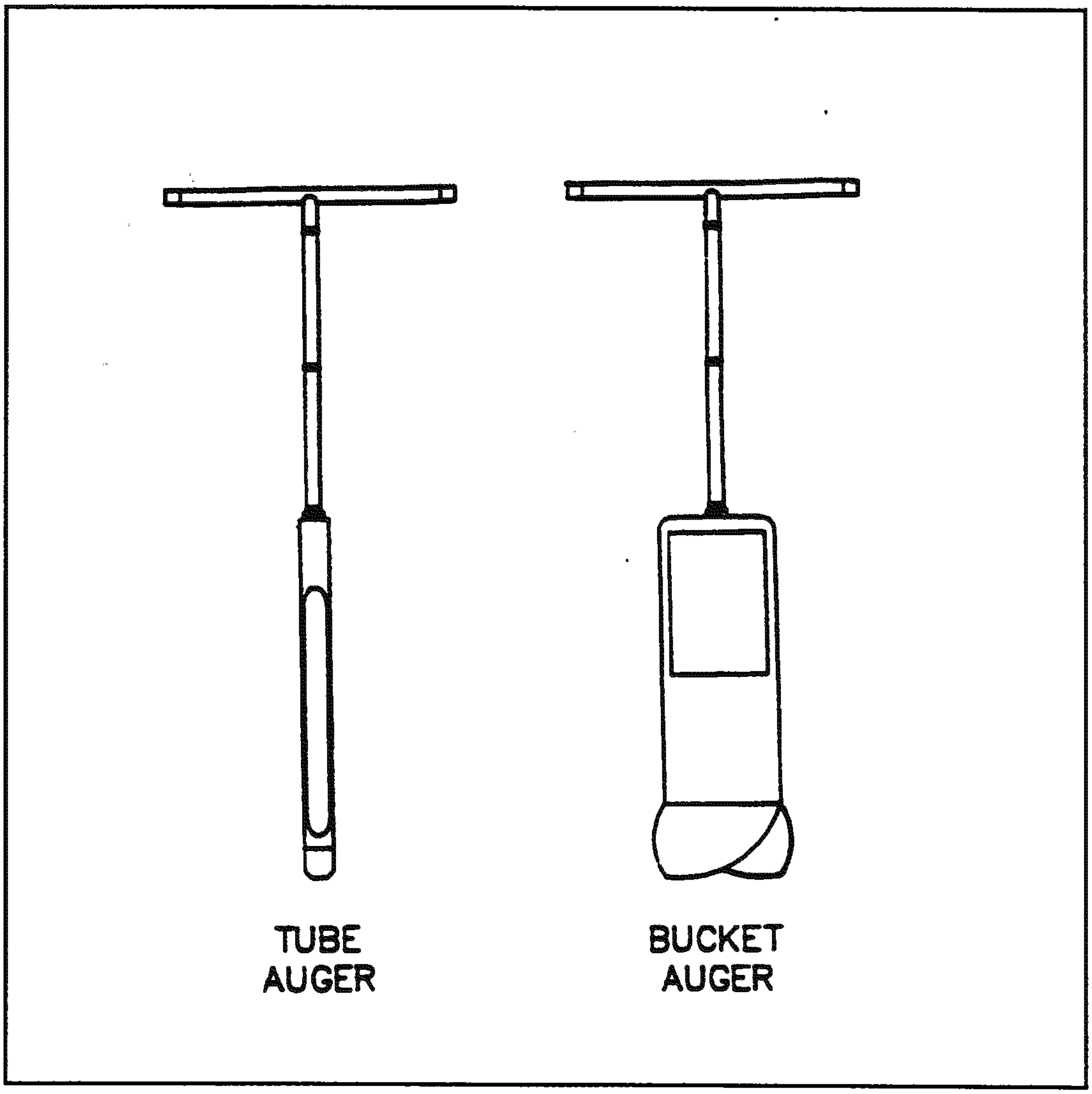
de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. Samplers and Sampling Procedures for Hazardous Waste Streams. 1980 EPA-600/2-80-018.

ASTM D 1586-67 (reapproved 1974), ASTM Committee on Standards, Philadelphia, PA.

APPENDIX A

Figures

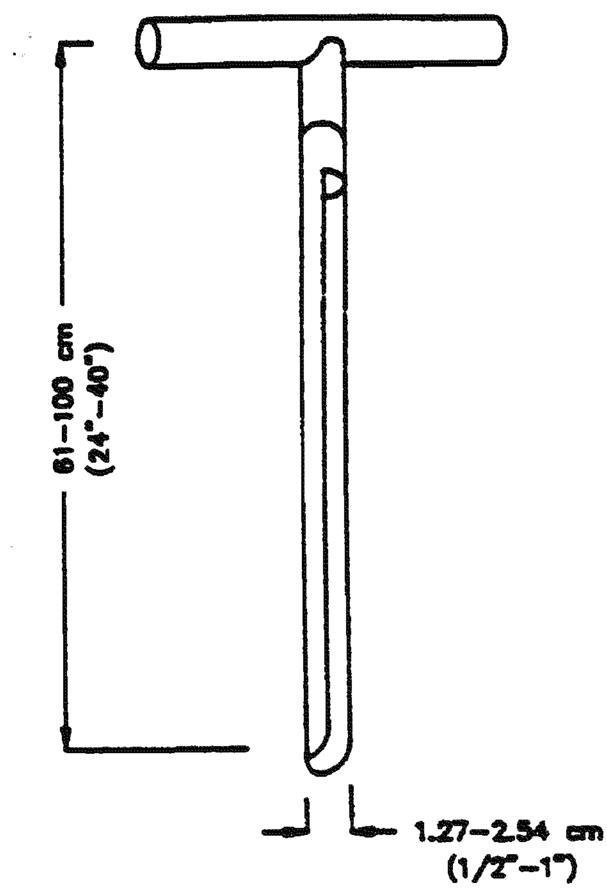
FIGURE 1. Sampling Augers



APPENDIX A (Cont'd)

Figures

FIGURE 2. Sampling Trier



ATTACHMENT C

Table 1 – Sample Descriptions/Rationale

TABLE 1
SAMPLE DESCRIPTIONS/RATIONALE
NIAGARA FALL BOULEVARD

SAMPLE NUMBER	DESCRIPTION/RATIONALE
2223-S01	Soil sample to be collected from the paved parking lot area is located on the Niagara Falls Boulevard (NFB) site, depth: 0-6 inch interval directly below slag material.
2223-S02	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S03	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S04	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S05	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S06	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S07	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S08 **(MS/MSD)**	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S09	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S10	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S11	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S12	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S13	Soil sample to be collected from the paved parking lot area is located on the NFB site, depth: 0-6 inch interval directly below slag material.
2223-S14	Soil sample to be collected from an off-site location, to show background conditions depth: to be determined (TBD).
2223-S15	Soil sample to be collected from an off-site location, to show background conditions depth: TBD.
2223-S16	Duplicate of soil sample, from a location to be determined in the field, for QA/QC purposes.
2223-SG-01	Slag material sample from the paved parking area on the NFB property, depth: TBD.
2223-SG-02	Slag material sample from the paved parking area on the NFB property, depth: TBD.
2223-SG-03	Slag material sample from the paved parking area on the NFB property, depth: TBD.
2223-RIN01	Rinsate Blank (split spoon sampler) for QA/QC purposes.
2223-RIN02	Rinsate Blank (split spoon sampler) for QA/QC purposes.